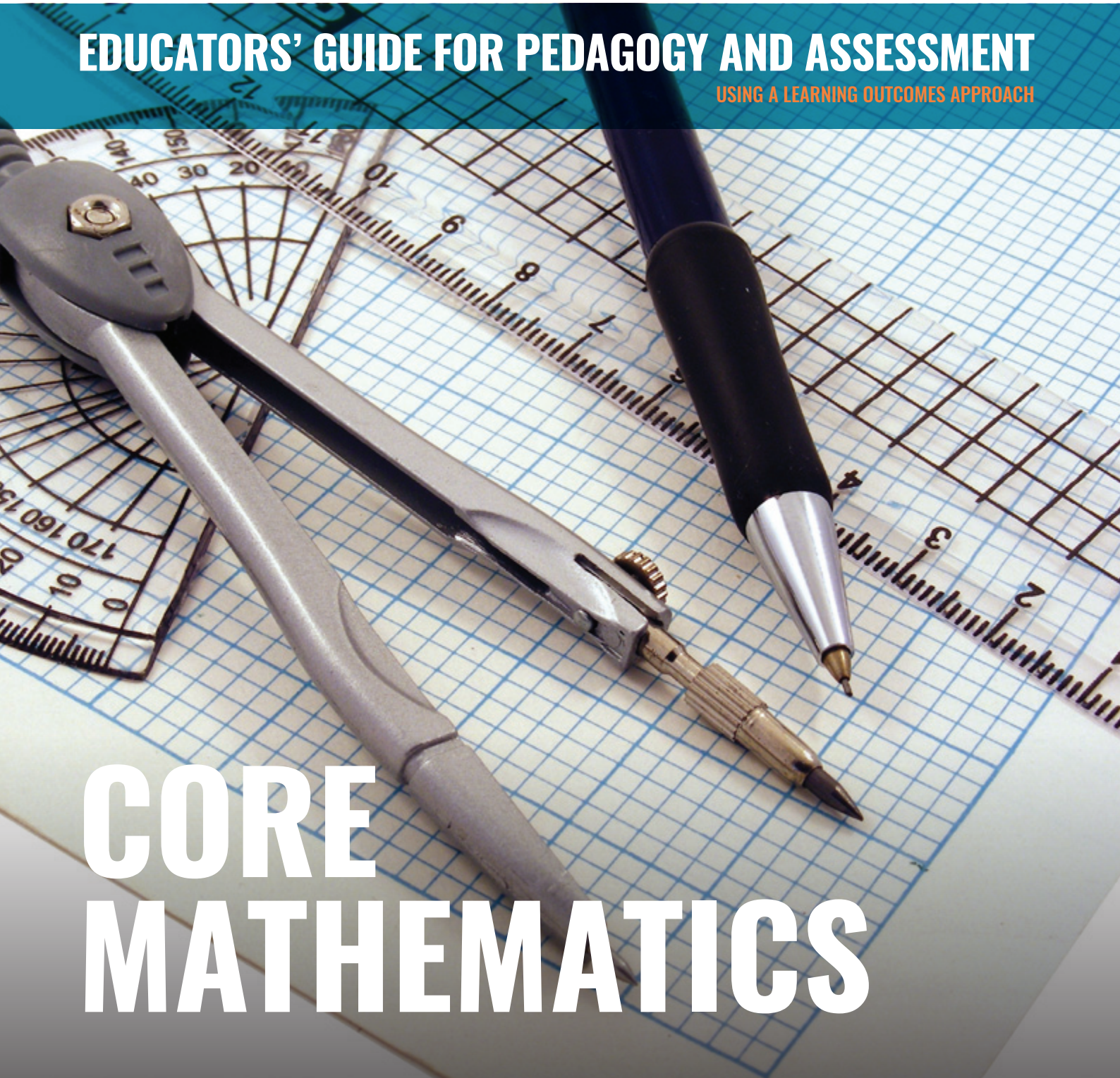


EDUCATORS' GUIDE FOR PEDAGOGY AND ASSESSMENT

USING A LEARNING OUTCOMES APPROACH



CORE MATHEMATICS

LEVELS **7** **8** **9** **10**



Learning
Outcomes
Framework



Learning Outcomes Framework

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Contents

Introduction	5
1. Subject Learning Outcomes	9
2. Pedagogy	
A. Pedagogy and good practice learning.....	20
B. Embedding the delivery of the Cross Curricular Themes.....	29
C. Reaching different learners within each level.....	34
D. Teaching different levels within one year group.....	39
E. Teaching one level across two year groups.....	40
3. Assessment	
A. Methodologies that will ensure fit for purpose assessment.....	42
B. Inclusive assessment methodologies.....	47
C. Reliable and valid ways of assessment.....	49
D. Assessing Cross Curricular Themes.....	51
E. Reporting Progress.....	52
References	55
Appendix: Cross Curricular Themes	57



Introduction

Following the endorsement of the National Curriculum Framework (NCF) in 2012, an ambitious plan was launched with the aim of putting theory into practice. Built upon the National Minimum Curriculum (2000), it addressed the gaps in Malta's learning processes where emphasis shifted from teaching the subject to teaching the learner.

The National Minimum Curriculum framework took important policy-related documents issued by the European Commission into consideration. These included the *Key Competences for Lifelong learning – A European Reference Framework* (included in the annex of the Recommendations; 2006/962/EC); the *Strategic Framework for European Cooperation in Education and Training* (ET 2020; 2009) and *Europe 2020 – A Strategy for Smart Sustainable and Inclusive Growth* (COM (2010) 2020) which is the follow up to the *Lisbon Strategy for Growth and Jobs* (Memo 06/478/12 Dec 2006).

Against the background of Malta's historical development and on the basis of the curriculum and EU documentation the NCF seeks to provide strategic direction by rationalising the necessary changes and their implications for area/subject content, pedagogies and assessment. The NCF was presented within a lifelong learning perspective and celebrates diversity by catering for all learners at each stage of their education. It aims to introduce more equity and decentralisation in the national system. The NCF seeks to present a seamless curriculum which reflects smooth transitions, building and extending on the firm foundations in early childhood education. In essence, the NCF aims to provide a quality education for all learners, reducing the percentage of early school leavers and encouraging their enrolment in further and higher education.

The NCF proposed a Learning Outcomes Framework (LOF) as the keystone for learning and assessment throughout the years of compulsory schooling. The aim of the Learning Outcomes Framework is to free schools and learners from centrally-imposed knowledge-centric syllabi and to give them the freedom to develop programmes that fulfil the framework of knowledge, attitudes and skills-based outcomes that are considered national education entitlement of all learners in Malta. The LOF is thus intended to eventually lead to more curricular autonomy of colleges and schools so as to better address the learning needs of their learners.

A number of other local policy documents published in recent months have also contributed to the need of a learning outcomes-based approach in today's educational structures. In particular, the *Framework for the Education Strategy for Malta 2014 – 2024* (2014), *A National Literacy Strategy for All in Malta and Gozo 2014 – 2019* (2014), *A Strategic Plan for Early School Leaving in Malta 2014* (2014), *Education for All: Special Needs and Inclusive Education in Malta* (2014), *Malta National Lifelong Learning Strategy 2020* (2015) and *Respect for All Framework* (2015) all point toward the need to provide equitable opportunities for all learners to achieve educational outcomes at the end of their schooling which will enable them to participate in lifelong and adult learning, reduce the high incidence of early school leaving and ensure that all learners attain key competences in literacy, numeracy, science and technology.

The ESF 1.228 Project – *Design of Learning Outcomes Framework, Associated Learning and Assessment Programmes and Related Training* is intended to deliver this Learning Outcomes Framework approach to the educators and all relevant stakeholders within compulsory schooling. It addresses the holistic development of all learners and advocates a quality education for all as part of a coherent strategy for lifelong learning which aims to ensure that all children have the opportunity to obtain the necessary skills and attitudes to be future active citizens and to succeed at work and in society irrespective of socio-economic, cultural, racial, ethnic, religious, gender and sexual status.

The LOF will allow for flexibility in teaching and learning programmes in order to address specific needs and to build upon strengths within the context of the learning communities in different colleges and schools. This concept of flexibility is promoted throughout the entire framework. While acknowledging that out-of-school factors such as poverty and social exclusion affect learner achievement, the LOF seeks to improve learners' learning experiences by encouraging creativity, critical literacy, entrepreneurship and innovation at all levels. This will allow learners to reach their potential by connecting what they have learnt to their individual contexts. Consequently, this will help learners develop a positive attitude towards learning and a greater appreciation of its usefulness.

The move from a prescriptive content-based curriculum towards a learning outcomes approach will impact all programmes in schools and all external examinations and assessment at the end of compulsory education in Malta.

The LOF was also designed to meet the four broad education goals outlined in the *Education Strategy for Malta 2014 – 2024* (Ministry for Education and Employment, 2014), namely to:

- reduce the gaps in educational outcomes between boys and girls and between students attending different schools, decrease the number of low achievers, raise the bar in literacy, numeracy and science and technology competence and increase student achievement.
- support educational achievement of children at-risk-of-poverty and from low socio-economic status and reduce the relatively high incidence of early school-leavers.
- increase participation in lifelong learning and adult learning.
- raise levels of learner retainment and attainment in further, vocational and tertiary education and training.

The Learning and Assessment Programmes (LAPs) which were drawn up for each subject will ensure that the focus is on the learner. As such, learning activities will be geared to stimulate creativity and imagination; enable learners to make correct value judgements when editing/correcting their own work; develop learners' investigative and constructive skills by making use of different media and promote receptive skills (listening and reading) which lead to productive skills (speaking and writing). LAPs are also intended to create an atmosphere where learners develop their own problem solving skills and their ability to think and reason logically; reflect on outcomes and consequences and explore possible alternatives and apply interesting and realistic contexts that are personally meaningful to them.

With the use of LAPs, teachers will be encouraged to create situations and resources which are intrinsically interesting, culturally embedded and cognitively engaging and enable learners to connect the various types of information that they have acquired.

THE LEARNING AND ASSESSMENT PROGRAMME FOR PROJECT-BASED MATHEMATICS

This document, which is aimed at policy makers, educators and teachers in the classroom, presents the Learning and Assessment Programme (LAP) for Project-Based Mathematics.

The LAP comprises:

- **The Learning Outcomes Framework (LOF)** - this encompasses a set of subject learning outcomes (SLOs) that set out what a learner is expected to know, understand, or be able to do as a result of a process of learning. These learning outcomes are designed to be used in a range of delivery contexts, and taught using different methods. They state the end result rather than describe the learning process or the learning activities.
- **Notes on Pedagogy and Assessment** - this encompasses a set of subject learning outcomes (SLOs) that set out what a learner is expected to know, understand, or be able to do as a result of a process of learning. These learning outcomes are designed to be used in a range of delivery contexts, and taught using different methods. They state the end result rather than describe the learning process or the learning activities.

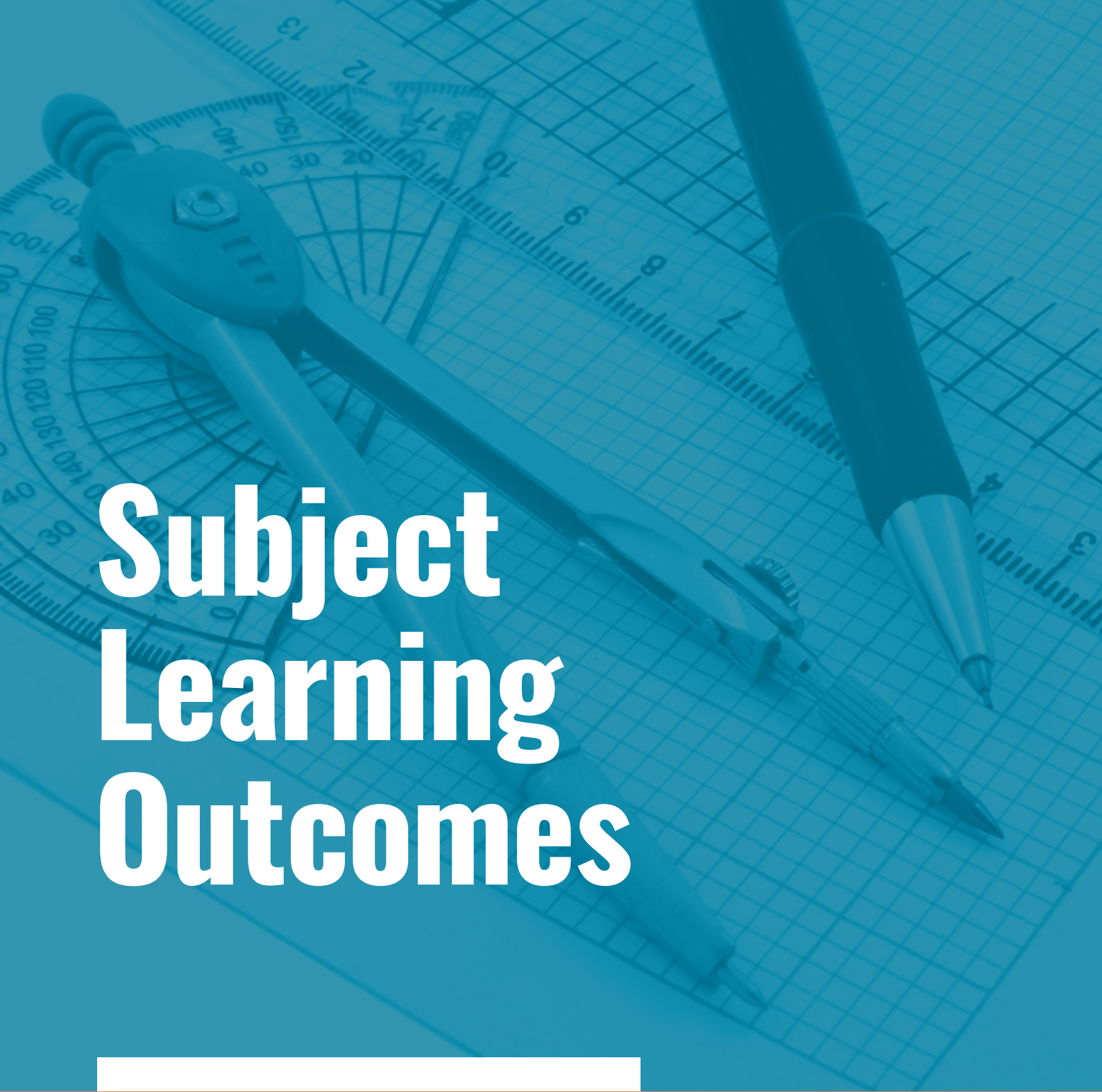
This document has been collaboratively developed by the Outlook Coop Learning Outcomes Framework Joint Venture comprising Outlook Coop as the lead partner, East Coast Education Ltd. and the University College London Institute of Education together with the Directorate for Quality and Standards in Education (DQSE). Mr Barry Smith (Joint Venture Technical Director), Mr Godfrey Kenely (Joint Venture Contract Director), Dr Michelle Attard Tonna (Head of Project) and Mr Gaetano Bugeja (Project Leader) directed the project experts.

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Subject Learning Outcomes

CORE MATHEMATICS

LEVELS **7** **8** **9** **10**

The Subject Learning Outcomes (SLOs) for Project-Based Mathematics span from Attainment Level 7 to Attainment Level 10. The learning outcomes at Attainment Level 7 should serve as pre-requisite skills needed for learners to embark on studying this subject.

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 learners further.

The core concept is *better* rather than *more*. At 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.

It should be noted that each Attainment Level can be extended further and suggestions for this will be included in the Pedagogy and Assessment section of the document.






LEVEL 7

Subject Focus: Number - The Number System





1. I can use whole numbers in practical contexts.
2. I can recognise and work with directed numbers in real life situations, including temperature changes.
3. I can demonstrate and use equivalences between common fractions, decimals and percentages.
4. I can recognise and use numerical patterns.

 COGNITIVE LEARNING





Subject Focus: Number - Numerical Calculations

1. I can add, subtract, multiply and divide whole numbers using a range of strategies.
 COGNITIVE LEARNING
2. I can add and subtract decimals up to two decimal places.
 COGNITIVE LEARNING
3. I can add and subtract, multiply and divide fractions.
 COGNITIVE LEARNING
4. I can make calculations mentally and on-paper.
 COGNITIVE LEARNING
5. I can find simple percentages of whole number quantities.
 COGNITIVE LEARNING
6. I can express a quantity as a percentage of another.
7. I can find percentage increase and percentage decrease.
8. I can use formula to work out simple interest.
9. I can recognise and work with directed numbers in real life situations, including temperature changes.
10. I can write ratios in their simplest form.
11. I can use simple map ratios.
12. I can work through simple situations that involve direct proportion using the unitary method including money, speed distance, time, weight and capacity.
13. I can work with quantities in a given proportion.


Subject Focus: Algebra - Fundamentals of Algebra

1. I can work out the input/output of number machines inspired by real examples such as equations involving degrees Celsius and Fahrenheit.
 LEARNING TO DO
2. I can recognise and create geometric and number patterns and relationships in mathematics.
3. I can plot points and read coordinates from a grid in all four quadrants.
 READING AND UNDERSTANDING
4. I can draw the graph of a linear equation given in the form $y = mx + c$.
 MANAGING LEARNING
5. I can define and work out the gradient of slope.
6. I can write the coordinates of a set of points for equations *e.g.* $y = 3x$, $y = -4$ or $y = 3x + 4$.
 WRITING
7. I can continue a conversion graph to find a missing reading.
8. I can compare and contrast information from two or more line graphs concerning real-life situations.

Subject Focus: Shape, Space and Measures - Measures

1. I can show and label the eight compass points.
 COGNITIVE LEARNING
2. I can identify and distinguish between right, acute, obtuse and reflex angles. I can also estimate their size and can order them according to size.
3. I can estimate the size of an angle and can use a protractor to measure and draw angles up to 360° .
4. I can convert and use units of length, mass, capacity and volume to smaller or larger units in simple situations.
5. I can calculate the area of compound shapes that are made up of rectangles and right-angled triangles.
6. I can define the meaning of a solid shape.
7. I can define the meaning of capacity.
8. I can define the surface area of a solid shape.
9. I can calculate the surface area and volume of cubes and cuboids.
10. I can distinguish between prisms and pyramids and find the volume of prisms.
11. I can draw and interpret simple scale drawings.
 WRITING
12. I can read and write the vocabulary related to time.
 READING AND UNDERSTANDING
13. I can use standard units of time and know the relationships between them.
14. I am able to convert different units of time, use the 12-hour/24-hour clock, and read and use a timetable and a calendar.
 READING AND UNDERSTANDING
15. I can estimate and calculate time using seconds, minutes and hours.

Subject Focus: Shape, Space and Measures - Euclidean Geometry




1. I can classify triangles, quadrilaterals and other polygons by their geometric properties.
2. I can recognise geometric properties in everyday objects.
3. I can understand the terms 'regular' and 'irregular' polygons.
 READING AND UNDERSTANDING
4. I can use positive and negative coordinates to plot points and draw shapes.
5. I can identify the centre, radius, diameter and circumference of a circle.
6. I can construct 60° and 90° angles, perpendicular bisector and angle bisector, and triangles using a ruler and compasses only.

7. I can construct 60° and 90° angles and triangles using a dynamic geometry software package.
8. I can construct regular hexagons using ruler and compasses only.
9. I can construct regular hexagons using dynamic geometry software.
10. I can draw different views of a given solid.
11. I can identify possible and impossible nets of cubes and cuboids.


Subject Focus: Shape, Space and Measures - Transformation Geometry

1. I can classify triangles and some quadrilaterals using reflective symmetry.
2. I can identify and draw lines of symmetry in triangles and quadrilaterals.
3. I can identify shapes having rotational symmetry and find their order of symmetry.
4. I can identify the reflective and rotational symmetries of a regular polygon.
5. I can create tessellating shapes and draw a tessellation.

Subject Focus: Data Handling and Chance - Statistics




1. I can select and represent data using a variety of statistical diagrams.
 CREATIVE LEARNING
2. I can extract and interpret information from frequency tables, diagrams, charts and graphs.
3. I can collect and record discrete data and organise and represent information in different ways to suit different purposes.
 CREATIVE LEARNING
4. I can find and interpret averages in different data to compare distributions.
5. I can find the mean, mode, median and range in a data set.
 MANAGING LEARNING

Subject Focus: Data Handling and Chance - Probability


1. I can use the probability scale from 0 to 1.
2. I can find the theoretical probability of an event happening and an event not happening.
3. I can distinguish between experimental and theoretical probability.
4. I can find the probability of an event by experiment.
5. I can construct a possibility space and use it to work the probability of an outcome.
 WRITING

LEVEL 8



Subject Focus: Mathematical Application

1. I can represent practical problems in familiar and unfamiliar contexts mathematically, for example, practical problems involving basic operations for fractions, percentages and decimals with converting between all three.
 COGNITIVE LEARNING
2. I can identify and obtain necessary mathematical information to tackle a task, project or a mathematical problem.
3. I can select mathematical operations and strategies in an organised way to find solutions.
4. I can apply my knowledge of mathematical operations in a logical and organised way.
5. I can make decisions about ways to undertake a given mathematical project.
6. I can work as an individual or as part of a group on a given mathematical project.
 INTERPERSONAL
7. I can produce a product or presentation to show the outcomes of project-based mathematical challenges.
8. I can discuss the development and outcome of a project.
 INTERPERSONAL
9. I can apply the checking procedures at each stage of a mathematical process.
10. I can explain the contribution made by a mathematician to human advancement *e.g. the work of Pythagoras*.
11. I can use a calculator and a spreadsheet for tedious calculations involving whole numbers, fractions, decimals and percentages.


Subject Focus: Number - The Number System

1. I can demonstrate the order of operations when calculating.
2. I can design and explain mathematical patterns.
3. I can present large numbers in expanded notation, *e.g. 293 as $2 \times 100 + 9 \times 10 + 3$*
4. I can write large numbers in standard form and can use numbers in standard form in calculations.
 WRITING


Subject Focus: Number - Numerical Calculations

1. I can work through simple situations involving percentage increases and decreases using a multiplying factor.
2. I can work out reverse percentage calculations.
 COGNITIVE LEARNING
3. I can work out the number of repayments needed to repay a loan.
4. I can work out compound interest, appreciation and depreciation.
5. I can make estimations and approximations.
6. I can round numbers to a specified degree of approximation.
7. I can check the reasonableness of results.
8. I can make reasonable approximations and can use these approximations to check the calculations.
9. I can use rounded numbers to carry out rough approximations.
 COGNITIVE LEARNING
10. I can calculate and convert between currencies.
11. I can calculate with units of measure between systems, using conversion tables and scales, and approximate conversion factors.



Subject Focus: Algebra - Fundamentals of Algebra

1. I can construct formulae to solve word problems involving one or two operations.
2. I can evaluate expressions by substituting values.
3. I can construct formulae to solve word problems involving one or two operations.
4. I can extend patterns, sequences and relationships in mathematics.
5. I can use symbols, notation, graphs and diagrams to represent and communicate mathematical relationships and concepts.
6. I can understand, interpret and calculate the gradient of a line.
7. I can solve two simultaneous linear equations graphically.
8. I can interpret linear and non-linear graphs arising from real-life situations.
9. I can produce graphical representations of direct and inverse proportion to determine unknown quantities, including speed vs time.
-  LEARNING TO DO
10. I can work through situations leading to solutions of linear equations in one unknown.






Subject Focus: Shape, Space and Measures - Measures

1. I can express any angle as a fraction of 360° .
2. I can use systems of measurement and interpret numbers on a range of measuring instruments, and choose and use appropriate units.
3. I can find the area and circumference of circles.
4. I can calculate the length of an arc and the area of sector as fractions of a circle.
5. I can calculate the area of compound shapes.
6. I can calculate the surface area and volume of a prism or cylinder.
7. I can demonstrate the difference between length, area and volume using appropriate formula and units of measurement.
8. I can calculate the surface area and volume of a prism or cylinder.
9. I can draw and use scale drawings to find the actual distances and areas.
10. I can estimate distance and then find the actual distances using Google Earth.
-  MANAGING LEARNING
11. I can use and apply Pythagoras' Theorem when solving 2D problems.
12. I can apply trigonometric ratios in right-angled triangles when solving problems.



Subject Focus: Shape, Space and Measures - Euclidean Geometry

1. I can work out the size of the interior and exterior angles of convex polygons including regular polygons.
2. I can construct the locus of points which are at a fixed distance from a given point using a variety of methods including ruler and compasses and assistive technology.
-  COGNITIVE LEARNING
2. I can construct the locus of points which are equidistant from two given points using a variety of methods including ruler and compasses and assistive technology.
-  COGNITIVE LEARNING

Subject Focus: Shape, Space and Measures - Transformation Geometry




1. I can use the notions of similarity and congruence.
2. I can draw and describe reflections.
 MANAGING LEARNING
3. I can draw and describe rotations.
 MANAGING LEARNING
4. I can draw and describe translations using polygons.
 MANAGING LEARNING
5. I can draw and describe enlargements.
 MANAGING LEARNING
6. I understand that reflections, rotations and translations preserve length and angle.
7. I can understand that enlargements preserve angle but not length.
 COGNITIVE LEARNING
8. I can work out and use positive scale factors of enlargement.

Subject Focus: Data Handling and Chance - Statistics

1. I can design a survey to generate quantitative data.
 PRACTICAL
2. I can construct and interpret a histogram with equal intervals from a grouped frequency table.
3. I can calculate the mean, mode, median and range from a frequency table.
4. I can calculate and estimate the mean, identify the modal class, the range and find the class interval in which the median lies for a grouped frequency table.
 PRACTICAL

LEVEL 9

Subject Focus: Mathematical Application

1. I can interpret mathematical information used for different purposes.
 INTERPERSONAL
2. I can independently select and compare relevant information from a variety of graphical numerical and written material.
3. I can describe a practical activity, problem or task using mathematical information and language.
4. I can breakdown activities into smaller mathematical problems or tasks that are more manageable.
5. I can apply mathematical operations in a structured way to find solutions to straightforward, practical problems.
6. I can identify and specify suitable mathematical projects working individually or in a group.
7. I can work on complex project-based mathematics as an individual and as a group participant.
 SOCIAL LEARNING
8. I can evaluate the development and outcome of a project using appropriate criteria.
 INTERPERSONAL
9. I can interpret and communicate solutions to practical problems drawing simple conclusions and providing explanations.
10. I can demonstrate the importance of a mathematical law, proof or contribution made by particular mathematical thinker to human development and understanding, *e.g. Euclid, Napier, or Fibonacci.*
11. I can represent a verbal problem as a mathematical problem.
12. I can use a calculator to perform and to check mathematical operations, including use of the memory and fractions functions.

Subject Focus: Number - The Number System

1. I can use ideas of direct and inverse proportion in calculations inspired by real-life examples.

Subject Focus: Number - Numerical Calculations

1. I can use ideas of direct and inverse proportion in calculations inspired by real-life examples.

Subject Focus: Algebra - Fundamentals of Algebra

1. I can understand and use function and inverse function notation.
2. I can link a graphical representation with a sequence and/or function.
3. I can interpret and understand rates of change presented in a variety of linear and non-linear graphs including travel graphs.
4. I can solve simple linear inequalities in one variable and represent the solution on the number line, *e.g. $7x + 5 < 33$.*
5. I can change the subject of a formula to meet my specific needs, *e.g. from $y=2x+5$ to $x=y-5/2$.*





Subject Focus: Shape, Space and Measures - Measures

1. I can use Pythagoras' Theorem in 3D.
2. I can use trigonometric ratios to work through simple situations involving angles and bearings in 3D.
3. I understand and can use the relationship between length, area and volume of similar shapes.

Subject Focus: Shape, Space and Measures - Transformation Geometry

1. I can identify planes of symmetry.

Subject Focus: Data Handling and Chance - Statistics



1. I can construct and interpret histograms with equal intervals from an ungrouped frequency table.
2. I can draw and interpret cumulative frequency diagrams.
3. I can identify an appropriate statistics-based project and interpret and communicate conclusions drawn.
 CREATIVE LEARNING
4. I can self-select the methods for collecting, manipulating and representing data.
 PERSONAL LEARNING
5. I can create a mathematical artefact to show how a statistical project has reached an outcome, for example a presentation, statistical chart or spreadsheet with conclusions drawn.
 CREATIVE LEARNING
6. I can construct a cumulative frequency table and use it to draw a cumulative frequency graph.
7. I can use cumulative frequency graphs to estimate the median.
 COGNITIVE LEARNING

Subject Focus: Data Handling and Chance - Probability

1. I can work out the probability of an event from a frequency table.
2. I can use experimental and theoretical probability to estimate and calculate the likelihood of events.
3. I can work out the outcomes of independent events.
4. I can work out the outcomes of dependent events using probability trees.

LEVEL 10

Subject Focus: Mathematical Application

1. I can set ambitious yet achievable project goals.
2. I can develop a mathematical maturity demonstrated by displaying a critical mathematical attitude.
 PERSONAL
3. I can apply appropriate rigour in a mathematical argument.
 COGNITIVE LEARNING
4. I can solve complex multi-stage problems involving the use of a range of different mathematical techniques autonomously.
5. I can explain the important contribution mathematics has made to another field of knowledge.
6. I can use the advanced functionality on a calculator, including the scientific calculator functions.

Subject Focus: Algebra - Fundamentals of Algebra

1. I can understand the relationship between $y = f(x)$ and its graph and be able to identify what role the variables x and y have in such equations.
2. I can find the derivative of $y = ax^n$.
3. I can find the solution to an inequality or set of inequalities on a graph by shading the appropriate regions.

Subject Focus: Shape, Space and Measures - Measures

1. I can calculate the area of segments of a circle.
2. I can calculate the area of sectors and segments of a circle.
3. I can find the distance between two points given the coordinates.
4. I can work with vectors with 2D using the base unit vectors i and j .

Subject Focus: Data Handling and Chance - Statistics

1. I understand that standard deviation is a measure that is used to quantify the amount of variation of a set of data and can work out situations related to the standard deviation.

Subject Focus: Data Handling and Chance - Probability

1. I can understand set notation.
2. I can work out simple situations involving the probability, the union and intersection of two events.



Pedagogy

A. PEDAGOGY AND GOOD PRACTICE LEARNING

Educators need to keep up-to-date with the latest pedagogical strategies and concepts in order to be able to better understand and respond to learners' needs. Europe's *Education and Training 2020* strategy puts special emphasis on the teachers' role in the lives of their learners. Teachers play a crucial role in guiding their learners towards their goals and shaping their perceptions (European Commission, 2015).

Project-Based Mathematics (PBM) makes use of project-based learning as the key vehicle in the learning of mathematics. It places the project at the centre of teaching, assessing and learning mathematics (see figure below). It is the project that drives teaching, learning, and assessment. Research shows that learners often cannot transfer their mathematical knowledge to situations outside the classroom. Projects engage learners in applications of mathematics, which may help them to transfer their mathematical skills to other disciplines and to real-world problems. Using significant problems often increases learner motivation, in turn promoting learning.



Project-Based Mathematics (hereafter PBM) incorporates the design of project-based mathematical activities that learners may undertake to use, apply, and learn new mathematical skills. A PBM curriculum would thus incorporate mathematical content knowledge within a number of units, (called projects), as will be explained in a later section. The projects' design considers both the content knowledge and the process skills that learners need to develop. Moreover, projects also involve learners in hands-on activities and as such, learners can carry out projects both in and out of the classroom.

PBM is designed to be a three-year engagement starting at Year 9 with the following aims:

- To provide a distinctive experience of learning mathematics.
- To support students in making sense of mathematics.
- To link the application of mathematics with real life situations.
- To present learners with mathematical challenges, situations, questions, tasks and problems, by providing them with opportunities to work collaboratively on projects.
- To offer students a learning experience with positive attitudes towards commitment, responsibility, flexibility and entrepreneurship; hence preparing learners for the world of work.

PBM is important because:

1. It addresses the need for a mathematics curriculum which is more hands-on (learners using a range of resources and manipulatives), more practical (learners creating models), more applied and less formal than the secondary level mathematics curriculum, and hence more accessible.
2. It matches the potential and aptitude of learners who may struggle to make it in the secondary level mathematics curriculum, but who can exhibit confidence and competence in a more practical mathematical approach.
3. It incorporates key processes and content that would provide learners with core mathematical knowledge to pursue a post-secondary course which is not related to mathematics or mathematically-related subjects.
4. It aims to develop sufficient mathematical awareness and appreciation which enables learners to apply mathematics to their life, and in their future world of work.

Learning to Learn Strategies

The following are examples of the strategies which form part of the 'learning to learn process', one of the eight competencies featured in the document *European Reference Framework Key Competencies for Lifelong Learning* (European Commission, 2006):

- Pedagogical discussions between learners where, on a voluntary basis, learners explain how they carried out a specific task and how they managed to overcome the difficulties encountered, resulting in an exchange of strategies and techniques in a cooperative environment.
- Teaching learners to make use of punctuation marks, pictures, additional information outside the text, such as accompanying explanation of difficult keywords and identification of keywords during reading/comprehension tasks.
- Teaching and guiding on the different stages of essay writing and the different tools and methods which could be adopted during each stage.

The Subject Learning Outcomes (SLOs) have been written in a way which will help educators to adopt engaging, enterprising and active learning approaches in a variety of contexts to promote and enable learner-centred teaching and learning strategies. Curriculum planners should regularly consider the opportunities presented by the SLOs at all stages, to develop active learning throughout the levels in the Learning Outcomes Framework. Planning should be responsive to, as well as encourage participation by the learner, who can and should influence and contribute to the process.

A coherent approach to planning learning, teaching and assessment, and to sharing information about progress and achievements is needed to support curriculum planning, and to ensure that all learners have access to an active and enterprising learning environment. In undertaking this type of curriculum planning, it is important not to see the SLOs as limiting factors containing the learning potential of learners, and preventing any deviation of learning beyond that contained within the SLOs. This view fails to take into account the scope and flexibility provided by the learning outcomes approach. How, where and when the outcomes are taught and learned is at the discretion of the educator. The SLOs are there to demystify the assessment process by setting out straightforward learning expectations. In doing so, assessment is bound to evidencing the meeting of these same expectations.

Once the learning expectations are set, educators can begin to introduce the flexibility in curriculum design and delivery that has been difficult to do up to this point. The learning outcomes approach allows educators to lean more towards learner-centred teaching and learning strategies. This will mean knowing, among the many ways learners are different from one another, which of the many ways of learning are significant to the learning at hand, and how to deal with this variance in ways that are supportive of the individual learners and will allow them to progress. Section C *Reaching different learners within each level* offers guidance on how this can be done.

There are a number of key principles in teaching and learning mathematics in this way. PBM supports:

- **The use of key knowledge and the development of mathematical understanding**
Each project should focus on learning goals that include the learning of (1) mathematical content and (2) process skills, such as critical thinking, problem solving, collaboration and communication.
- **Projects with ‘achievable challenges’**
Projects should be designed to present a meaningful problem to solve or a question to answer. Projects also need to encourage creativity, and engage learners in decision-making and exploration. Moreover, projects need to be gauged to present an ‘achievable’ level of challenge; that is, they ‘require learners to exert mental effort, performing a task that is just difficult enough to hold their interest but not so difficult that they give up in frustration’ (Willis, 2010: 17).
- **Projects that are appealing to learners**
Projects should feature real-world contexts, practical tasks and authentic challenges. Projects should speak to the learners’ personal concerns, interests and issues in their lives, and their future world of work.
- **A sustained inquiry approach to learning mathematics**
The projects must engage learners in a rigorous, extended process of asking questions, finding resources and applying and using information.
- **Learner voice and choice**
Learners should take an active role in making key decisions about the projects. These include how they work, what to create, and how to present and communicate their work.
- **A ‘cooperative inquiry’ to working on projects**
Learners, together with educators, should reflect on learning, the effectiveness of their inquiry and project activities, the quality of learners’ work, the obstacles encountered and how best to overcome them (Heron and Reason, 1997).
- **A formative assessment**
Embedded in the teaching and learning process is assessment that is principally formative. This implies that learners are open to giving, receiving, and using feedback to improve their process and products (Hodgen and Williams, 2006).
- **Projects as public products**
In PBM, learners are expected to make their project work public. This is done by explaining, displaying and/or presenting it to people both in and beyond the classroom.

Dos and Don'ts for Project – Based Mathematics:**Dos**

Project-Based Mathematics should promote:

- the practical application of mathematics, and thus projects should present real-life challenges.
- problem-based learning and teaching – teaching that starts by presenting learners with a practical task or a challenging question/problem.
- concrete experiences.
- the use of achievable challenging projects that provide multiple entry points for learners.
- mathematical processes for doing mathematics.
- the application of mathematical content.
- the active participation of learners.
- teaching for understanding.
- a high proportion of collaborative work.
- the learners' ability to think, explore, discuss, and communicate mathematical knowledge.
- active learning pedagogies, in which the responsibility of learning lies mostly within the learners.
- a high degree of continuous assessment practices which will be part of the final certification awarded for this subject. This will occur by ensuring that gaps in the learners' learning of numeracy are intervened upon, so that they may proceed to understanding the more complex projects presented.
- a change in the mentality, from being the subject for unsuccessful learners at the general curriculum of mathematics, to becoming a subject that offers a different perspective and a new possibility for doing, learning and using mathematics. In so doing, PBM will cater for a wider range of diverse learners, taking into account that every learner is an individual being while also ensuring that learners appreciate its utilitarian and aesthetic aspects.

Don'ts

Project-Based Mathematics should not:

- promote learning by rote.
- involve learners in working on repetitive exercises and questions.
- be example-based – teaching that starts with an example, followed by students working on similar ones.
- necessarily be presented in a linear fashion progressing from the easy to the difficult.
- involve merely the teaching for skills.
- be based solely on summative assessments.
- be driven by a textbook as the only resource.
- focus on content breadth.
- restrict the learning environment solely to the classroom, and thus targeting the learning styles of a restricted group of learners.

PBM draws on Project-based learning (PBL). PBL is an instructional model based on the constructivist approach to learning. It entails the construction of knowledge with multiple perspectives within a social activity, and allows for self-awareness of learning and knowing while being context dependent (Duffy and Cunningham, 1996).

Project-based learning

Project-based learning is learner-centred, and learners have a significant voice in selecting the content areas and nature of the projects that they undertake. There is considerable focus on learners understanding what it is they are doing, why it is important, and how they will be assessed. Indeed, learners may help to set some of the goals over which they will be assessed, and how they will be assessed over these goals. All of these learner-centred characteristics of PBL contribute to learner motivation and active engagement. A high level of intrinsic motivation and active engagement are essential to the success of a PBL lesson.

From the learner's point of view, Project-Based Learning:

- is learner-centred and intrinsically motivating.
- encourages collaboration and cooperative learning.
- allows a learner to make incremental and continual improvement in their work.
- is designed so that learners are actively engaged in 'doing' things rather than in 'learning about' something.
- is challenging and focuses on higher-order skills.

From the educators' point of view, Project-Based Learning:

- has authentic content, purpose and assessment.
- is teacher facilitated - but the teacher is more of a 'guide on the side' than a 'sage on the stage.'
- has explicit educational goals.
- provides a major role for the educator in setting the learning goals of the project.
- provides opportunity for formative evaluation.
- provides the opportunity for the educator, learner and others to help in the summative (final) evaluation.

From a research point of view, Project-Based Learning is supported by work in:

- Constructivism
- Situated Learning Theory
- Inquiry and Discovery-Based Learning
- Cooperative Learning
- Individual and Collaborative Problem Solving
- Peer Instruction
- Problem-Based Learning

Adapted from *ICT-Assisted Project-Based Learning*, Moursund (2006).

PBM is aligned with the five key design criteria for positioning mathematics in the curriculum (Thomas, 2000), namely mathematics should:

- be central to the curriculum.
- focus on problems that drive the learners to struggle with key concepts.
- involve the learners in constructivist investigations.
- be learner-driven.
- present realistic challenges.

Project-Based learning has been found to be an effective and enjoyable way to learn and develop deeper learning competencies required for success in school, everyday life and work. Teachers of PBM will find that it will:

- **make mathematics more engaging for learners.** It seems that learners today, more than ever, tend to find mathematics a boring and meaningless subject, unrelated to their own personal lives and interests (see Hernandez-Ramos and DeLaPaz, 2009). With PBM, it is expected that learners become more active working on projects that engage their minds, providing real-world relevance for learning mathematics.
- **improve learner learning of mathematics.** After completing a project, learners would understand content more deeply, remember what they learn and retain it longer than is often the case with the traditional approach of teaching and learning mathematics (see Grant and Branch, 2005). Moreover, learners who gain mathematical content knowledge would be expected to be able to apply what they know, and can do so to novel situations.
- **support the development of mathematical skills for school, career and life.** In the 21st century workplace, success requires more than basic knowledge and skills. In a project, learners learn how to take initiative and responsibility, build their confidence (see Katz and Chard, 1992), solve problems, work collaboratively in teams, communicate ideas and manage themselves more effectively.
- **develop key skills and experience success.** Mathematical projects would emphasise real world application of knowledge and skills; the development of critical thinking, problem solving, collaboration, communication in a variety of media, and speaking and presentation skills (see Wolk, 1994). Neo and Neo (2009), for example, state that learners' interest, critical thinking abilities, presentation skills and communication skills, and their ability to work effectively on a team will be enhanced when learners work on a PBL activity.
- **provide opportunities for learners to use technology.** Most learners are familiar with and enjoy using a variety of technological tools. With and through technology, teachers and learners may not only find resources and information and create products, but also collaborate more effectively, and connect with experts, partners, and audiences around the world.
- **make teaching mathematics more enjoyable and rewarding.** Projects would allow teachers to work more closely with learners while doing high-quality meaningful work. A study by Ravitz (2008) shows that the strongest reasons given by teachers for Project-Based Learning use was the teaching of skills beyond the content, making learning more personalised and more varied, as well as teaching academic content more effectively. Indeed, we believe teachers may rediscover the joy of learning alongside their learners.
- **connect learners and schools with communities to the real world.** Projects would provide learners with empowering opportunities to make a difference, by solving real problems and addressing real issues. Learners learn how to interact with adults and organisations, are exposed to workplaces and adult jobs, and can develop career interests. Parents and community members can be involved in projects.

The Learning Outcomes Framework for PBM is designed around the following strands:

- *Number:* Learners need to develop number sense and computational fluency by understanding the way numbers are represented and the quantities they represent. They should be able to calculate mentally and on paper, make estimates and approximations, and check the reasonableness of their results.
- *Algebra:* Learners need to recognise patterns and relationships in mathematics and in the real world. They should be able to use symbols, notation, graphs and diagrams to represent and communicate mathematical relationships and concepts.
- *Shape, Space and Measurement:* Learners need to acquire knowledge of the geometrical properties of 2D and 3D shapes. They should develop spatial awareness, and be able to recognise the geometrical properties of everyday objects. They should know and understand systems of measurement.
- *Data Handling and Choice:* Learners should be able to form a survey question, formulate a questionnaire, ask relevant questions in questionnaires/interviews and collect raw data, measure central tendency and spread, and choose appropriate tools to compare and contrast results. They should also develop the skills to present data in tables, charts and a variety of graphs. They need to be able to use experimental and theoretical probability to estimate and calculate the likelihood of events.
- *Mathematical Application:* Learners should develop the ability to use, apply and learn mathematical content while solving real-life problems. By engaging with project-work, learners should also develop the skills of selecting techniques and strategies, developing coherent plans, taking decisions, working collaboratively, producing mathematically-based artefacts and/or models, and explaining and presenting their work to others.

The initial strand of SLOs in the Learning Outcomes Framework specifies the learning and assessment expectations around PBM as a process, and as a means to produce meaningful mathematical outcomes. This section provides the PBM conceptual framework through which the mathematics content is to be delivered.

Introducing PBM is not without challenge and teachers using a PBL approach and implementing a PBM curriculum need to be prepared to:

- take on a constructivist learner-centred approach.
- select and incorporate a range of projects.
- develop project-based schemes of work.
- adopt new assessment strategies.
- create and manage a PBM classroom environment.

How can PBM be embedded within its Learning Area?

Project-Based Mathematics should help learners to build confidence and experience success when using and applying mathematical skills in everyday life. This subject should thus be developed in the form of a project-delineated scheme, where each project represents units that target the learning outcomes.

Learning opportunities should be provided within a variety of both closed and open-ended projects that can be adapted to provide each learner with a sense of achievement and accomplishment irrespective of their level of mathematics. The educator should also offer a balanced mix of exposition, discovery and exploratory learning, as well as including the fun element, thus taking into consideration the affective domain of learners – making mathematics more enjoyable, practical and relevant to learners' lives. Learners should be encouraged to work both individually and collaboratively to carry out realistic projects, with extensive support from the teacher. This approach to learning should enhance learners' readiness for entry to the world of work or to further study.

The PBM curriculum should provide flexibility with assessment on a basis of coursework and an examination so that learners are not disadvantaged. Learners should be assessed continuously over the course of study on a specified number of finished projects (refer to table presented earlier). This would ensure feedback to learners, parents and teachers about learners' progress. Therefore, the use of continuous assessment is envisaged by stressing a high weighting of the overall assessment on coursework (portfolio) and a low but still significant weighting on an exam. Placing a high degree of weighting on the coursework is believed will help motivate learners to actively engage with the mathematical projects they are presented with.

Mathematics as a Human Endeavour

Some of the important developments in mathematics are named after specific people (for example; Euclidean geometry, Pythagorean Theorem). Learners could select a person from the history of mathematics and undertake a project designed to increase their knowledge of an important mathematician, and share their increased knowledge with other learners. Investigative work could look to discover the importance of the mathematical work from an applied perspective, showing why it was significant.

The Subject Learning Outcomes (SLOs) have been written in a way which helps educators to adopt engaging, enterprising and active learning approaches in a variety of contexts to promote and enable learner-centric teaching and learning strategies. Curriculum planners at all stages should regularly consider the opportunities presented by the SLOs to develop active learning throughout the levels in the Learning Outcomes Framework. Planning should be responsive to, as well as encourage participation by, the learner who can and should influence and contribute to the process.

To support curriculum planning and to ensure that all learners have access to an active, enterprising learning environment, a coherent approach to planning learning, teaching and assessment and to sharing information about progress and achievements is needed. In undertaking this type of curriculum planning, it is important not to see the SLOs as limiting factors containing the learning potential of learners and preventing any deviation of learning beyond that contained within the SLOs. This view fails to take into account the scope and flexibility provided by the learning outcomes approach. How, where and when the outcomes are taught and learned is at the discretion of the educator. The SLOs are there to demystify the assessment process by setting out straightforward learning expectations. In doing so, assessment is bound to evidencing the meeting of these same expectations.

Once the learning expectations are set educators can begin to introduce the flexibility in curriculum design and delivery that has been difficult to do up to this point. The learning outcomes approach allows educators to lean towards learner-centric teaching and learning strategies. This will mean knowing the many ways in which learners are different from one another, which of the many ways of learning are significant to the learning at hand and how to deal with this variance in ways that are supportive of the individual learners and allow them to progress. Section C: Reaching different learners within each level offers guidance on how this can be done.

B. EMBEDDING THE DELIVERY OF THE CROSS CURRICULAR THEMES

Across Europe there has been a shift from an exclusively subject-based approach to a more cross curricular, thematic, inter-disciplinary and collaborative approach that reflects real life situations and encourages transfer of skills from one learning area to another. Through a cross curricular approach, many curricular areas have been given a higher profile and a number of transversal competences have enhanced their status (European Commission, 2012). The CCTs connect the subjects by highlighting common learning objectives which are also reflected at in the school ethos (Ministry for Education and Employment, 2012: 31, 39).

The Cross Curricular Themes (CCTs) have been introduced in the LOF to ensure that all learners, as they progress through the levels, come into continual contact with the types of knowledge, skills and understanding needed to participate actively, prosper and contribute to Maltese society.

The embedding of the CCTs in the Subject Learning Outcomes offers access to a new learning identity that goes beyond the subject; learners will value the CCT learning when they see that it is an integral part of the Learning Outcomes Framework and that it is vital in helping them become holistic learners.

Each CCT is presented as a set of additional learning outcomes that young people need to encounter and develop a knowledge and understanding of as they progress through the Learning Outcomes Framework.

The Cross Curricular Themes are:

Digital Literacy



Education for Diversity



Education for Entrepreneurship, Creativity and Innovation



Education for Sustainable Development



Learning to Learn and Cooperative Learning



Literacy



The Cross Curricular Themes can be found in the Appendix and online at <http://www.schoolslearningoutcomes.edu.mt/en/category/cross-curricular-themes>

The CCTs need to be embedded within the learner's learning journey and experiences, the main point being that the CCT knowledge and understanding needs to be learned, consolidated and secured within a context. The context is important in order to add meaning and purpose and to reinforce the usefulness of the CCT. There is no one effective way of organising the embedded learning of the CCTs. However, directly linking a CCT outcome to an appropriate practical task within an SLO and then ensuring that there is an opportunity for CCT support at the time the practical task is undertaken is a particularly effective way of embedding a CCT.

Embedding is not just about interlinking different curricula. Mapping where the CCT content might fit in with SLOs or Subject Foci is only a starting point. The educator needs to establish how the CCT content adds value to the SLOs being taught and how something greater than just the sum of the different parts can be achieved. In essence, the CCT learning adds value in the establishment of key transferable knowledge, skills and understanding by starting with meaningful 'situated' engagements with the learning.

Embedding as a process

There are three main ways to approach the delivery of the knowledge, skills and understanding addressed in the CCTs in the learning process. These are:

- through delivery of and the learning associated with the SLOs
- by choosing particular teaching methods and strategies over others to deliver the SLOs.
- undertaking specifically constructed cross curricular or whole school activities.

This process implies an important shift in the way teachers approach the teaching of the subject content in the classroom. Integrating the cross curricular learning outcomes in the teaching of separate subjects requires teachers to step outside their traditional boundaries and work in close collaboration with one another to develop their approach to the CCTs and to exchange information about the learning development of specific learners in relation to the CCTs (European Commission, 2012:25).

Delivering CCTs through the SLOs




The first approach to the delivery of CCT content is by integrating the CCT learning with that of particular SLOs. The framework provides guidance on the best opportunities to do this. Where a particular SLO presents a good opportunity to address learning related to a Cross Curricular Theme a CCT icon appears after the SLO. This indicates that the SLO:

- creates a naturally occurring opportunity to begin to look at learning and skills development associated with a particular aspect of a CCT.
- can be enhanced or enriched by introducing a particular aspect of one of the CCTs.

To guide the educator to the specific learning outcomes of the CCT that are most relevant, the CCT icon which is attached to the SLO in question also includes a heading to identify which particular aspect of the CCT is the 'best fit', i.e. the part of the CCT content that is most closely linked to the knowledge, understanding and/or skills addressed within the SLO.

Although only one CCT has been identified this does not necessarily mean that other CCTs are not relevant. The identification of a particular theme merely suggests that the educator may find the one identified to be the most relevant, most appropriate or easiest to embed at that particular point, allowing the educator to teach the subject and the CCT in an integrated way.

Examples of this type of embedding in Project-Based Mathematics include:

- I can work on complex Project-Based Mathematics as an individual and as a group participant.
 SOCIAL LEARNING
 Taken from Level 9, Subject Focus: Mathematical Application.
- I can apply appropriate rigor in a mathematical argument.
 COGNITIVE LEARNING
 Taken from Level 10, Subject Focus: Mathematical Application.
- I can work out the input/output of number machines inspired by real examples *such as equations involving degrees Celcius and Fahrenheit*.
 LEARNING TO DO
 Taken from Level 7, Subject Focus: Algebra.

Example: Finding opportunities to address CCT learning in Core Mathematics SLOs

- I can work on complex Project-Based Mathematics as an individual and as a group participant.

 SOCIAL LEARNING

Taken from Level 8, Subject Focus: Mathematical Application.

Within the Learning to Learn and Cooperative Learning CCT, the Social Learning content requirements offer a range of opportunities to introduce CCT learning that will enhance the learner performance in PBM. Once developed, these skills can be applied in most project work and will enhance the learner's experience and performance. For example, the CCT posits the following learner-centric statements:

- I can appreciate diverse viewpoints and personalities.
- I am confident in discussing my views with others.
- I can follow the ideas of others and comment on their views.
- I can debate and support my argument without being judgmental, and still being empathic towards others.

Each of these outcomes will help the learner become an active and supportive participant and contributor to any group work, and are worth the time spent discussing, developing and consolidating early on in the PBM programme. Other aspects of the Learn to Learn and Cooperative Learning CCT looks at the following abilities:

- I learn by designing products while working on projects with others.

As the guidance suggests in this chapter, the signposted CCT may not be the only one that could be embedded. For example, the working with others in a group dimension of the SLO offers an opportunity to select some contentious environmental topic to create situations where there may be different points of view within the group. This moves the focus across towards embedding Education for Sustainable Development. The issue of differing perspectives will also occur naturally as part of the group working decision-making process, where a range of ideas - potentially competing ones - will have to be discussed and synthesised into a group course of action based on agreement.




As part of the process of developing group ideas into a collaborative PBM artefact, there will also be an opportunity as part of the process to cover learning and skills development associated with the following:

- I can communicate my ideas and present my opinions in thoughtful and informed discussions and decision-making processes.
- I can identify priorities and evaluate potential consequences of different decisions and actions.



So, there are two levels of embedding opportunity within this SLO. The first is more generic and contained within the actual group work process at the centre of the SLO. The second is in the selection of a project focus that deals with an issue at the centre of the Sustainable Development agenda that can be the focus of a performance.

Addressing CCTs through use of particular teaching methods and strategies

CCTs can be used to inform the creation of departmental policies and strategies; for example, by deliberately structuring learning to maximise the use of digital technologies. At the school Maths Departmental or team level, the following CCTs may be particularly suitable to help inform the pedagogy choices and delivery styles selected to maximise the flexibility introduced by the LOF:

-  Learning to Learn and Cooperative Learning
-  Digital Literacy
-  Education for Diversity

Educators may find that the following CCTs have a role to play in the choice of topics to stimulate interest and debate:

-  Education for Sustainable Development
-  Education for Entrepreneurship, Creativity and Innovation.





It will become evident that some of the CCTs are naturally suited to particular learning and teaching styles. Section *C Reaching different learners within each level* provides guidance on how particular CCTs can equip learners to thrive in particular learning environments. Deliberately choosing particular teaching strategies involving active and/or experiential learning and problem solving approaches where a certain degree of learner autonomy as well as team work is required will help frame learning in ways conducive to the introduction of the Digital Literacy and Learning to Learn and Cooperative Learning CCTs.

For example, the Learning to Learn and Cooperative Learning CCT comprises a category of learning outcomes on Personal Learning and, by addressing the learning related to this category of the CCT, learners will be developing the learning skills to bring to any task where a degree of autonomy and self-management is required. Similarly, the Social Learning category within the same CCT can help learners develop a framework of skills, attitudes and behaviours that will help them make the most of group or team work and other social learning strategies.

The Digital Learning CCT will help learners develop the competencies related to managing learning, sourcing, manipulating, communicating and presenting information. Having these types of learning skills embedded in the learning before they are most heavily used or required will help the learner approach the tasks with greater confidence in both the process of learning about SLOs and in demonstrating achievement of the outcomes themselves.

Addressing CCTs through cross curricular or whole-school activities

All the CCTs can be used as whole-school strategies for creating a high quality learning environment that values all learners and sets high expectations for all. Schools may see the benefit in having whole-school policies on the advancement of:

-  Literacy
-  Digital Literacy
-  Education for Diversity
-  Education for Sustainable Development

These types of CCTs can be used to help inform whole-school policies as well as add real value to the learning within the classroom. However, other CCTs may be used to form the basis of whole Year Group activities, or wider all-learner school initiatives around environmental issues. For example:

- The Education for Sustainable Development CCT could be used to form the basis of whole-school extra-curricular activities related to the Eko-Skola type of initiatives or low energy use initiatives. Fundraising activities to help with a school pursuit of renewable energy sources might bring together learning from this CCT with that of the Education for Entrepreneurship, Creativity and Innovation CCT.
- The Education for Entrepreneurship, Creativity and Innovation CCT could be used to underpin the learning and experiences associated with activities ranging from a 'learner-owned' tuck shop to a school event or whole-school initiatives about the world of work.

C. REACHING DIFFERENT LEARNERS WITHIN EACH LEVEL

One of the benefits of working within a Learning Outcomes Framework (and at the same time one of the challenges) is the ability to allow learners to progress at their own speed and to be able to adapt the teaching methodology and curriculum to meet their learning needs. The SLOs clearly show where the learning ‘finish line’ is at each level for each learner but educators need to acknowledge and plan for those learners who will reach this point quicker than some and also for those who may need more time and more scaffolding to be able to get to the standard required.

The Subject Foci are not rigid or restrictive and do not have to be delivered in a particular sequence or as discrete content areas taken in isolation. Subject Foci can be overlapped and blended into larger (or smaller) learning programmes. Educators may prefer to approach the learning contexts in a different order depending on the situation, or to deliver aspects of the learning through preferred topics.

Diversity of learners

The NCF embraces diversity and requires that this be promoted through an inclusive environment.

The NCF addresses the needs of:

- gifted and talented learners for whom the process of learning needs to be sufficiently challenging to engage and motivate them to develop their talents.
- learners with special educational needs for whom the curriculum should be written in a way that allows the teachers to appreciate how every student can access the same curriculum in every learning area and allows for the assessment of a continuum of ability.
- learners with severe disabilities for whom the curriculum should offer an education based on a continuum of abilities expressed in terms of developmental phases.
- learners from disadvantaged social backgrounds for whom the school, in collaboration with key local and institutional stakeholders in the community, needs to up-skill and support families and the local community to provide an environment that is educationally rich and stable.
- learners from diverse social, cultural and linguistic backgrounds including children of refugees and asylum seekers for whom the curriculum should include access to an educational programme which is embedded within an emotionally and psychologically supportive environment that respects their individual circumstances.

A National Curriculum Framework for All, Ministry for Education and Employment (2012:41)

The PBM examples provided in the SLOs are not restrictive and the educator will be able to add more stretching content for learners able to cope with the additional challenge. The examples provided are the suggested minimum requirement to perform at that level.

All classrooms, even where setting is used, will comprise a range of abilities. This is because learners will have different strengths and limitations and will develop at different rates. To define a ‘mixed ability’ class simply as a group of learners with a range of abilities is overly simplistic. What about the range of learning styles and preferences, interest levels and home backgrounds, which all impact on the learning experience? Each learner will show strengths at different times depending on the topic being studied and the learning style being used. When they are outside their learning comfort zone they will perform less well. It is unrealistic to expect any group of learners, whatever their ability, to progress through a body of work at exactly the same pace. Two thirds of learners in a classroom will be working outside their learning style unless the task is varied.

One of the most effective ways to ensure that different learners are reached within each level and throughout the LOF is to teach learners to think for themselves. Some of the CCTs provide the toolkit of knowledge and skills for learners to be able to become more effective, resilient, resourceful and autonomous learners.

Progression and differentiation in learning

The principles of diversity and inclusion which underpin the NCF imply that at all stages learners of all aptitudes and competences should experience success, challenge, and the necessary support to sustain their effort. They need flexible learning programmes providing diverse learning experiences that cater for a wide spectrum of learners and allow for different rates of progression as children and young people work through their school years. Different approaches are needed to address different learning needs. With the focus increasingly on the learner, and with more mixed-ability classes in schools, differentiated approaches are becoming more important and teachers need to adopt strategies that build on children's and young people's previous learning and help them progress.

A National Curriculum Framework for All, Ministry for Education and Employment (2012:40)

Strategies for teaching a mixed ability class

The teacher in the classroom must start by making a connection with each learner in their classes on a personal level by knowing and using their names and getting to know what interests them. Incorporating areas of interest into the learning can be a good way to engage learners. Similarly, using this type of knowledge when setting homework or individual class work can be a useful motivator and may help keep learners engaged.

Personal Learning:

- I can identify the support and resources I need to learn.
- I am aware of my preferred way to learn and can use this to plan my own learning.
- I manage goals and time efficiently in learning.
- I feel competent in managing my own learning.
- I am open to feedback from others and am able to consider it.
- I reorganise myself by explicitly changing my assumptions over time.
- I am able to follow my own interests as this helps me to reflect on 'who I am'.
- I am pleased when I succeed at difficult tasks.

Taken from the Learning to Learn and Cooperative Learning CCT

Ways to empower learners and make them more able to thrive within the LOF

Create a dynamic learning environment by:

- managing the classroom and creating opportunities for learners to work individually, in pairs and in groups.
- changing the layout of the classroom to match the learning taking place.
- providing a choice of differentiated activities, allowing learners to select their level of engagement and challenge. This will help with the 'ownership' suggestion listed further down.
- using carefully selected and differentiated resource banks.
- presenting different ways to learn the same thing.

Engage learners by:

- creating a sense of learner ownership of the learning process by, for example, allowing learners to choose their own project.
- allowing learners to demonstrate their understanding in different ways, for example through self-selected means, be it a visual representation, an oral presentation or physical demonstration.
- building in the higher order thinking skills using Bloom's taxonomy (at all levels) and working with the SLOs to keep learning tasks interesting, providing useful stretch and challenges as SLOs are given added dimensions or are approached from different directions. This can be done by giving learners problem-solving tasks with the opportunity to transfer and apply their knowledge to a new context.

Turn learners into resilient learners by:

- at an early stage introducing the learners to the key learning strategies encompassed by the Learning to Learn and Cooperative Learning CCT.
- discussing the learning objective in each lesson with learners, making them aware of what they are expected to achieve by the end of the lesson. The SLOs (written in the first person) are directed at the learner.
- making learners aware of different learning styles; teaching learners techniques for learning new content using visual, auditory and kinaesthetic modes of learning and varying teaching strategies to cater for visual, auditory and kinaesthetic learners.
- teaching learners how to be less dependent on the teacher. For example, how do they get themselves 'unstuck' if they are stuck?

Use group work to:

- allow for reinforcement and extension (by using flexible groups).
- encourage learners to engage in Social Learning and to appreciate diverse viewpoints and personalities; build confidence in discussing their views with others; collaborate with other learners as part of their learning; seek out guidance and support from other learners; talk with others about learning; listen to others talk about learning and discuss various subjects and learning strategies with peers (by using mixed ability groups).

An inclusive approach to teaching and curriculum planning needs to be ensured. While the school will want to create an ethos of achievement for all learners, valuing a broad range of talents, abilities and achievements, the teacher will need to work out what that means in their classroom. At a basic level this starts with promoting success and self-esteem by taking action to remove barriers to learning, thus making sure that all learners in all groups thrive in the classroom. Teachers can overtly promote understanding and a positive appreciation of the diversity of individuals in their class and use the Diversity CCT as a catalyst for this approach extending it to include the learner directly.

Values- based education

Education is as much about building character as it is about equipping students with specific skills. The way forward for the implementation of the framework is through values-based education. Values-based education refers to any explicit and/or implicit school-based activity which promotes student understanding and knowledge of values and which develops the skills and dispositions of students so they can enact particular values as individuals and as members of the wider community. It ensures that those leaving school should have qualities of self confidence, high self esteem, optimism and commitment to personal fulfilment as a foundation for their potential life roles as family, community and employees. Furthermore they should have the capacity to exercise judgement and responsibility in matters of ethical and social judgements.

Adapted from *Respect for All Framework*, Ministry for Education and Employment (2014:10)

Schools should have a vibrant and progressive culture, promoting well-being and respect, with ambition and achievement for all learners as its focus. This type of approach needs to be taken in each classroom. A great school is a caring school that supports every single person, irrespective of background or learning need. Such schools work in an atmosphere of unconditional positive regard. They work tirelessly to promote healthy and productive attitudes to learning, to life and to work. Developing an ethos of achievement and ambition defines the aspirational nature of successful schools, making the connection between expectation and success - success which covers all aspects of developing skills for life, for work and for learning - a hallmark of excellence.

From the perspective of the classroom, an inclusive approach addresses learners' needs through a variety of approaches including: early intervention strategies and a curriculum and approaches to learning and teaching which are designed to match the needs of all learners. Educators should have high expectations of their learners because they need to be encouraged to have high aspirations and goals for themselves. It is imperative that educators ensure that their learners know where they are in relation to their learning and how they can improve. Learners should be praised regularly, selectively and effectively to keep motivated.

As learners progress within the levels and between levels they should be encouraged to reflect on, take increasing ownership of and assume more responsibility for their own learning. Educators should start to introduce techniques to allow learners to make increasingly greater use of self-assessment to identify their strengths and development needs from the evidence of their efforts and act on feedback given from peers as well as teachers in order to plan their next steps.

The educator can gather evidence of progress as part of day-to-day learning during individual and collaborative activities; for example through writing assignments and presentations, and using ICT as appropriate. Specific assessment tasks will also be valuable in assessing progress. Approaches to assessment should identify the extent to which learners can apply the required skills in their learning and daily lives, and in preparing for the world of work. For example:

- How well do they contribute to discussions?
- Are they increasingly able to extract key information from data?
- To which extent can they actively contribute to group work, and when needed, work autonomously?

D. TEACHING DIFFERENT LEVELS WITHIN ONE YEAR GROUP

There will be learners within each class that need more time to be able to achieve the learning needed to demonstrate achievement of the SLOs. As learners progress through their learning journey they may move to a new year and start a new level but still have areas of unsecured learning from the previous level. The first important factor here is clarity of information on progress following this learner that makes it clear to their new teacher what support or additional work they may need to ensure that they can progress on to the new level.

Section C *Reaching different learners within each level* referred to the use of a range of strategies designed to respond to the different learning preferences of each learner. Where learners are entering the class in need of support to secure some aspects of the previous level it is important that:

- there is clear information about where the areas in need of support are.
- it is clear how these areas relate to progression and achievement in the new level.
- there are a range of strategies and learning devices available to match the learning style to the learner preference to assist with early progression.
- conversation with the learner about areas in need of support or reinforcement remains positive, learner-affirming and constructive.

One of the benefits of the LOF structure is that Levels 7 and 8 are delivered across two-year curriculum windows allowing time to develop learning programmes and deploy a range of learning methods to help learners progress and achieve.

There are a few models to consider when looking at introducing a measure of stretch for learners able to achieve SLOs well within the delivery time associated with the level. Educators may want to consider:

- exploring the SLOs in a broader and/or deeper way, perhaps looking to transfer or apply learning associated with the SLOs in new contexts.
- using more exacting or challenging texts.
- adding stretch by setting more challenging or complex tasks which exposes the learner to more challenging texts and vocabulary or introduces new Subject Foci or new areas of existing Subject Foci, remembering that the SLOs do not set a ceiling on the learning.
- looking at opportunities offered by the CCTs as sources of inspiration for introducing new areas of content to provide additional curriculum content that both enhances the subject learning experience and looks at CCT content in perhaps different or more challenging ways.

One other key source of material related to provision of additional challenge or stretch is the Subject Foci and SLOs from the level above. While it may not always be appropriate to begin to address these directly, educators may want to look at the contextual learning or preparation work that serves as a good introduction to learning at the next level. The focus here is on looking at the bridges between the learning in each level and how the learner can begin to access this learning. In this type of approach, as with the other areas of extension work, it will be important to keep a proper record of achievement to be able to inform teaching staff working with the learners when they move formally to the next level.

Although the above suggestions will help educators address the challenges of differentiation, it is nevertheless acknowledged that it is hard to implement differentiated instruction in a heterogeneous classroom, especially if educators are not supported or they do not know what they are differentiating – the curriculum or the instructional methods used to deliver it. It is hence important to give teachers clear guidance and support on what they need to do to differentiate instruction and be responsive to the needs of each learner by taking into account what they are teaching and who they are teaching. Time should also be factored in for teachers to assess their learners' needs, interest and readiness levels and to plan and design appropriate activities for each learner. These concerns can be addressed through effective professional development that strongly encourages teachers to apply their skills and which provides coaching throughout the process of using differentiation as a teaching approach.

E. TEACHING ONE LEVEL ACROSS TWO YEAR GROUPS

Within the LOF, Levels 7 and 8 have an added additional layer of challenge in curriculum planning and design in that both levels run across two different years. For example, Level 8 SLOs sit across Years 9 and 10. This means that educators need to consider how they might want to structure the delivery programmes needed to achieve the SLOs that will allow learning to take place in a meaningful and coherent way across two years that capitalises on any progression opportunities within the level. However, this wider window to reach the standard of a level also helps deal with some of the challenges discussed in the previous chapter.

When looking at the content shaped by the SLOs within a level, educators may be able to identify SLOs that are considered to be prerequisites for others in the same level and structure the curriculum accordingly. Some Subject Foci may naturally be delivered before others or educators may look to design and implement a curriculum that has more of a spiral curriculum progression feel to it. Educators may even feel that there are different ways to work with the Subject Foci, wrapping them up and addressing the SLOs by creating new subject areas incorporating the Subject Foci.

Alternatively, educators may feel more comfortable starting with some generic arithmetic teaching that underpins a number of different Subject Foci, or that predominantly focuses on two subject areas likely to need reinforcement early on to help build confidence and create a better foundation for other learning. There is also the ability to look at the Learning to Learn and Cooperative Learning aspects of the CCT likely to reinforce the PBM approach. The decision on how best to approach the Subject Foci and the SLOs within the Subject Foci is essentially a local one. It is up to the educators to use their professional judgement on how best to do this based on their learners' needs, their preferred way of structuring the curriculum, and the types of resources they intend to work with.

There are at least three obvious potential approaches that educators may wish to consider:

- Developing a period of ground work or preparation style learning before proceeding on to the curriculum directly associated with the SLOs.
- Developing a developmental approach across the existing SLOs where some suitable Subject Foci and corresponding SLOs are addressed before others with these supporting the learning of the SLOs to be covered in the second year.
- Developing a curriculum and learning programme approach that exhibits a mixture of the above two approaches.

There are also the more ambitious approaches where the Subject Foci and SLOs are absorbed into a more locally designed approach that may meet the strengths and interests of the staff and learners in a better way. Educators have the freedom to decide if there is a more integrated way to deliver and learn the subject. The LOF allows educators this measure of control and innovation to the benefit of their learners. Whichever the method selected, curriculum planning, resource selection and the selection of teaching strategies will all be important.



Assessment

A. METHODOLOGIES THAT WILL ENSURE FIT FOR PURPOSE ASSESSMENT

Assessment

Assessment is an integral part of the learning and teaching process, providing students and their parents with continuous, timely and qualitative feedback about their children's progress, giving teachers' information about their practice and providing schools and colleges with information about their curriculum planning, learning and teaching.

Assessment *for* learning (assessment for formative purposes) is a process carried out as learning is taking place. Learners and their teachers use the outcomes to find what learners know and are able to do in relation to learning.

Assessment *of* learning (assessment for summative purposes) is carried out at the end of a unit, mid-year or at the end of the year.

Assessment *as* learning (ongoing assessment) is the use of ongoing self-assessment by learners in order to monitor their own learning.

In subjects that are taught as modules, assessment of learning will take place at the end of a module. Information and judgments about learning are pulled together in a summary form for purposes of reporting to parents and sharing information with other teachers in the next class or school. If learners are fully aware of what is expected of them (the learning intentions) and the success criteria against which their learning will be evaluated, they will develop the self-evaluation skills which will help them become self-directed learners.

Well-designed and appropriately implemented, classroom assessment processes can:

- support learners to use self-assessment to gauge their learning, identify their strengths, their learning needs and their next steps.
- encourage learners to support one another's learning through peer assessment.
- help teachers to understand children's learning better, use evidence to monitor learners' progress, reflect on their practice and adapt or match their teaching to their learners' needs.
- help teachers plan for the learning of individuals and groups and ensure that all children receive appropriate attention.
- support parents to share their children's learning experiences, interpret assessment information and follow their children's educational development.
- promote the reporting on individual progress and achievement in an incremental manner.

Colleges and schools are required to develop an assessment policy. The policy should seek to address the quantity and quality of assessment practices as well as reporting to parents and other stakeholders.

Adapted from *A National Curriculum Framework for All*, Ministry for Education and Employment (2012:41-42) and *Assessments as learning*, Lam (2015:1)

Learners and others involved in their learning need timely, accurate feedback about what they have learned and how much and how well they have learned it. This helps to identify what they need to do next and who can help them build up their knowledge, understanding and skills. A learner's progress should be assessed in ways and at times appropriate to their learning needs. Judgements made about this learning should be based on evidence from a broad range of sources, both in and out of school and by reference to a learner's progress over time and across a range of activities.

By planning for ongoing assessment opportunities and periodic testing, particularly where learners use their skills in an integrated way, educators will allow learners to demonstrate, over time, *how much* and *how well* they have learned.

A balance of ongoing and periodic assessment opportunities will require learners to demonstrate a body of learning built up over time and to apply their knowledge and skills in different contexts. Mixing a range of learner controlled formative assessment opportunities will allow the learners themselves gauge how they are progressing against individual or grouped SLOs.

Educators should look to gather a range of quality pieces of evidence to show progression in learning from both ongoing formative assessment opportunities and periodic, summative assessments. The amount and range of evidence should be sufficient to build up a profile of the learner's achievement in the four key skills, but in a proportionate and manageable way. Learners should be involved in the selection of evidence. The evidence should show that the learners have understood a significant body of knowledge, have responded consistently well to challenging learning experiences, and have been able to apply what they have learned in new and unfamiliar contexts.

The PBM coursework should require learners to work on projects for an extended period of time. Each project should be designed to engage learners in using and developing their mathematical knowledge and skills related to every-day life situations. The project could take the form of a complex question, a challenging problem or an intriguing situation, with learners being asked to explore, design and present a solution.

For PBM, assessment would be as follows:

- Coursework (Projects) would be 60%
- Exam would be 40%.

The three-year PBM coursework could look something like this:

Year	Number of Projects	Time-frame (In weeks per project)	Minimum Number of Projects Presented for Assessment
9	10	2	6
10	9	3	5
11	6	4	4

In the example provided, the PBM curriculum would incorporate 25 projects spread over 3 years. Learners would be expected to present a total of 15 complete projects by the end of Year 11, with at least 6 finished projects done in Year 9, 5 in Year 10, and 4 in Year 11.

Examples of potential projects

- 1. On Data Handling**
Learners take the role of a state official preparing a statistical report on the state, choosing a topic such as education. The end product can be a presentation with graphs and written descriptions of significant findings. The teacher may consider collaborating with a language, arts or social studies teacher for this project.
- 2. On Shape, Space and Measure.**
Learners take the role of an architect and design a shopping mall. Learners research the design of malls and the feasible sizes for various types of stores. The end product can be a brochure, poster, or webpage presenting the design to a panel of adults at their own local council.
- 3. On Algebra or Trigonometry**
Learners take the role of historian by researching the life of a mathematician of the past. Learners present an important contribution of the person, in addition to his or her life story. The end product can be a PowerPoint presentation about the mathematician given to interested learners or adults.
- 4. On Algebra**
Learners take the role of an investment planner. They research various forms of investments and formulas for calculating interest on savings. The end product can be a written report or investment plan, with relevant formulas defined and graphs as appropriate.
- 5. On Number and Application**
Learners can be asked to design a wall unit or a storage space with a fixed amount of money available. They would need to first estimate costs and then work out actual costs of building the unit. Moreover, they need to provide reasons for choosing a particular type of material, for the size of the unit and its structure. The end product could be a model of the unit, an actual unit or a computer-generated image of their model unit.

Learning, teaching and assessment should be designed in ways that reflect how different learners progress in order to motivate and encourage them in their learning. To support this, all learners should be involved in planning and reflecting on their own learning, through formative assessment, self and peer evaluation, and personal learning planning. The learners are thus given the chance to play an active role in self-assessment, which encourages them to seek out personal goals for learning PBM. These types of assessments can be planned at particular points, such as the end of a project, whereby the learners can judge and review their own performance.

PBM teachers will need to have a clear understanding of how their own learners are progressing in relation to others in their school and in other schools in Malta, against the outcomes and experiences at different levels. Regular, planned opportunities for dialogue are to be facilitated by Education Officers to help teachers reach a shared and consistent interpretation of meaning as they apply the SLOs.

In each skill, the learner does not have to be secure in every outcome at one level to move on to the next. When appropriate, the learner should have the opportunity to engage in learning experiences at the next level. Teachers should plan to provide the learners with an experience of all the outcomes, but should take a holistic view of achievements across the four skill areas. When learners have had a deep learning experience at one level, they should move on to the next.

Educators must ensure that their view of what a learner has achieved is supported by sound evidence. Their evaluation of this evidence must be consistent with the evaluations of colleagues in their own, or another, department or centre. Centres should plan together and use their professional judgement in coming to a shared understanding of what it means to achieve a level in each of the four skills. Emerging national guidance will support this process.

The delivery of the learning associated with the CCTs and the associated assessment is the responsibility of all teachers. Aspects of all of these, but particularly of literacy, will be a natural part of PBM lessons. Through learning how another language works, learners can understand their own languages better. Many of the skills required to talk, listen, read and write in PBM, will mirror the literacy skills being developed in Maltese and English language learning.

Improving the quality of teaching and learning also implies fostering a culture which ensures the transparency of quality assessment outcomes and having in place approaches, structures and roles played by internal and external school evaluation systems.

Quality assurance in education can be understood as policies, procedures, and practices that are designed to achieve, maintain or enhance quality in specific areas, and that rely on an evaluation process ... [that is] a general process of systematic and critical analysis of a defined subject that includes the collection of relevant data and leads to judgements and/or recommendations for improvement. The evaluation can focus on various subjects: schools, school heads, teachers and other educational staff, programmes, local authorities, or the performance of the whole education system.

Assuring Quality in Education: Policies and Approaches to School Evaluation in Europe,
European Commission (2015a:13)

Schools will need to begin to develop new quality assurance procedures, while enhancing existing ones, to support the introduction of the LOF and to secure its successful implementation in classrooms. This will need to be part of a whole-school implementation and quality strategy that could include opportunities for:

- Senior Management Teams taking an active interest in teacher CPD, monitoring teacher confidence levels and learner progress, e.g. sampling learners' work and leading whole-school self-evaluations.
- Heads of Schools creating shared preparation and planning time to help facilitate collaborative working.
- standards and expectations sharing through displaying learners' work aligned to levels to show progression, for example in work displayed on a 'learning wall'.
- staff engaging children and young people in discussions about progress and target-setting as part of planning to meet their learning needs.
- development of whole-school approaches to learning and assessment of CCTs.
- clear reporting strategies for feedback on progress within the school and outside the school, e.g. parents and guardians.

In PBM or Mathematics Departments (in addition to the activities listed above), educators will need to be engaged in:

- regular departmental meetings to plan learning, teaching and assessment in a coherent way, with colleagues sharing effective strategies which they see as improving learning and achievement of learners.
- collaborative planning with other teachers, peer review, and discussion of standards and expectations when teaching learners at the same level.
- cross-marking end of topic tests, periodic assessments and other internal assessments by marking learner work from other classes or groups, educators can engage in professional dialogue about the nature of the assessment, its fitness for purpose and the learner results.
- design of assessment materials, marking schemes and reporting strategies in collaboration with other teachers within the department or with appropriate staff in neighbouring schools.
- adopting strategies to avoid pre-judging outcomes, for example marking learners' work without knowing who the learner is.
- professional dialogue around learners' work that has been pre-marked to help reach an agreed view on quality and standards.
- Communities of Practice to share and/or strengthen their professional practice, focusing on sufficiency in assessment, consistency in interpreting SLOs, reporting progress to learners, parents and guardians, and other teachers.

The Directorate for Quality and Standards in Education (DQSE) will ensure that:

- Education Officers carry out quality assurance visits to validate accuracy of each school's self-evaluation evidence and sample quality and consistency of the learning, teaching and assessment.
- staff members collate and analyse a range of local and national data to be used as the basis of discussion with Heads of Schools, Deputies and Faculty Heads/Principals to inform planning for improvement of learners' achievements.
- where good practice is identified, Education Officers, School Management Teams and other key personnel organise good practice events for staff across schools within the authority to disseminate good practice.

B. INCLUSIVE ASSESSMENT METHODOLOGIES

To help allow vibrant and diverse classrooms to thrive and demonstrate their learning potential educators need to ensure that assessment in the classroom is fair and inclusive, allowing every learner to show what they have achieved and how well they are progressing. Educators can ensure that assessment meets all learners' needs by providing each learner with appropriate support, employing a range of assessment methods and options and, in doing so, affording all learners the best chance of success. This will mean using performance and assessment information from a variety of sources to monitor progress and to inform what needs to happen next in the learning journey.

Educators need to be aware of, and work to, the relevant legislative frameworks that support learners experiencing barriers to learning. Barriers may exist as a result of family circumstances, disability or health needs and social or emotional factors. Where these circumstances occur, learners are entitled to have their additional support needs recognised and supported at the earliest possible stage – by the school, educational authorities and / or the state. Assessment strategies will be effective when educators use a range of assessment approaches flexibly to identify strengths, learning and support needs for vulnerable, disengaged and hard-to-reach learners in their classrooms.

Supporting vulnerable learners

Supporting vulnerable learners may mean using planning tools such as personal learning plans or multi-agency coordinated support plans. Educators need to place the learner at the centre to ensure each learner with additional or diverse learning needs can achieve positive and sustained educational outcomes.

Teachers in the classroom create and are responsible for the learning environment where learners will learn PBM. This means actively catering for the diverse learning needs of their students. They need to consider whether the repertoire of learning and teaching approaches they use will deliver the aims and purposes of the LOF so they are accessible to all learners.

While schools need to consider which approaches will be most effective in helping to remove barriers to learning resulting from social and emotional circumstances including, for example, challenging behaviour, educators need to consider how these whole-school policies translate into action in the classroom.

Assessment planning and the resulting approaches taken (and instruments and methods used) need to ensure that all learners have an equal opportunity to demonstrate what they have learned and what they can do. Educators also need to consider what 'reasonable adjustments' to assessment approaches for disabled learners may look like in assessing ability. This may involve using appropriate assistive technologies. Given that good assessment practice is a key feature of teaching and learning, approaches used to help assess an individual learner's progress need to be as far as possible consistent with those used in the learning itself.

The principle of the continuum of achievement should be such that it allows a learner to follow the best pathway that will allow him or her to reach the maximum of his or her potential - irrespective of whether the student is a high flyer, has average abilities, basic abilities and/or has a disability. In this regard the NCF sought to establish a framework that ensures that, as far as possible, no student becomes a casualty of an education system that is unable to identify those learners who require encouragement and guidance. Equally importantly, the NCF allows for the introduction of different pathways that will truly allow a learner to develop his or her abilities in the manner best suited for him or her.

Adapted from A National Curriculum Framework for All, Ministry for Education and Employment (2012:5)

C. RELIABLE AND VALID WAYS OF ASSESSMENT

Assessment will involve planning high quality interactions with learners and will be based on thoughtful and probing questions drawn from the SLOs and designed to ascertain the extent to which the outcomes have been achieved. Learners will be clear about the kind and quality of work required to achieve success in the SLOs. The methods of assessment used need to reflect the nature of what is being assessed.

In the periods between formal assessment interventions individual learners should be encouraged to ask for and should be given timely feedback about the quality of their work that they can understand, reflect on and ask questions about. Educators should strive to encourage the learner's active engagement in discussion about their work and progress, and suggest the steps they can take to improve their performance.

Educators should seek to empower learners to develop the skills to evaluate their own and each other's work against the SLOs, encouraging them to develop an appreciation of their own learning needs, how well they are progressing towards achieving the standard exemplified by the SLOs and the types of action they need to take to improve their progress.

The SLOs have been written in a way that is designed to ensure that the learning expectation is clear. They also act like an anchor for any and all related assessment activity by defining the learning that is in scope for assessment activity and by omission being clear about what is not in scope. This makes the assessment process and assessment expectations more transparent for the learner. At times SLOs involve an additional layer of detail delivered through the use of exemplification to illustrate the nature of the challenge within the SLO or through a clear statement of what must be included as a minimum in addressing the learning associated with the SLO.

Where there is exemplification, the example given is designed to be indicative of the degree of difficulty or challenge expected to be reached in the SLO. The example adds a further layer of detail and clarity so the educator knows the standard the learner should be looking to achieve.

What the assessment should really be trying to establish is whether the learners have reached the standard of the SLO. Can they do what the SLO says they can do? Can they demonstrate the ability to do what the SLO claims for them and can they do it routinely, confidently and comfortably? Here the educator's professional judgement and the professional agreement on what constitutes achievement is important.

The assessment standard is not necessarily what is stated in the SLO. The standard is the shared and consistently applied interpretation of what acceptable learner performance in response to the SLO looks like. In order to reach this judgement, educators will need to work within the subject teaching community to agree what achievement looks like at each of the levels (e.g. Level 8), at the level of the Subject Foci within a level and at the level of an SLO where this is not immediately apparent and there is scope for ambiguity or interpretation.

Assessment within the LOFs will need to be subject to robust quality assurance procedures that are designed to instil confidence in teachers' assessment judgements and assure parents, guardians and other stakeholders that all learners will receive appropriate recognition for their achievements in line with the agreed national standards and that learners are making the appropriate progress in line with expectations.

Where assessment is for high stakes qualifications and external certification, particular safeguards are required to guarantee fairness to all young people and to provide assurance to parents and guardians, MCAST, the University of Malta and employers that the system is robust. To that end MATSEC will produce clear assessment plans for Level 9 and 10 assessment, detailing the balance between high-stakes external assessment and internal assessment procedures and quality assurance.

As learners approach points of transition (for example, across Levels) it is important to have rigorous and robust assessment and related quality assurance procedures in place in order to ensure that there is a reliable system for sharing information about progress and achievements. Again, MATSEC and/or DQSE will be responsible for producing the guidance documentation detailing the policy and procedures for any transition assessment arrangements involving high-stakes or external assessment.

Working the room: Measuring the impact of the teaching

This whole class assessment technique can be used with Level 8 and 9 learners. Challenge stations are to be set up around the room, and there should be a sufficient number to split the class into groups of 3-5 with a different challenge presented to each group. The challenges should be related to what has recently been taught in class, and should be based on two or three distinct learning outcomes. The groups should be balanced out evenly in terms of ability, with the addition of the elements of time and reward to keep motivation high and maintain the competitive spirit. The assessment of the activity will provide a good idea of how the whole class has understood what has been taught.

For example; some challenges could be focused on discrete (de-contextualised) mathematics computation (e.g. fractions, conversion between decimal and fractions, interpreting data represented in tabular or graphic form). Other challenges could be more contextualised and involve discrete application of mathematics to solve a problem. The results will give a good indication of areas where learners are less confident, allowing the teacher to reflect on how these areas were taught and how they could be revisited.

Adapted from *Designing Effective Activity Centers for Diverse Learners: A Guide for Teachers At All Grade Levels and for all Subject Areas* (Hilberg, Chang and Epaloose, 2003).

D. ASSESSING CROSS CURRICULAR THEMES

The embedded CCTs within the SLOs are for guidance purposes only. As already indicated, the teacher may have better ideas of where, when and how to embed particular aspects of the CCTs.

The CCT icon in embedded SLOs is followed by a sub-heading from the CCT. This indicates the particular area of content that seems most appropriate for embedding within the delivery of the SLO.

The guidance about CCTs also describes how CCTs can be addressed through the choice of pedagogy or delivery style, classroom activity or approach to learning. Some may also be addressed through the introduction of whole-school or year group, curriculum enrichment activities or the adoption of particular sets of behaviours within the school community. The flexibility and freedom to decide upon and select which methods, opportunities and aspects of the CCTs are addressed when, where and how is entirely a subjective one. The aim is to ensure that the learners, through the course of their learning journey through the LOF, come into contact with the key learning associated with all the CCTs in significant and meaningful ways. The role of the CCTs is to yield resilient, adaptable, empowered young people with the robust, transferable skills the country needs to remain caring, inclusive, competitive and productive. This needs to be kept in mind when looking at the overall implementation and embedding of CCTs in the curricula.

This open and flexible approach to where, when and how CCTs are addressed is a challenge when it comes to trying to prescribe assessment approaches. While the lack of uniformity and consistency of when, where and how to embed CCTs in the LOF and in each subject area is attractive from a flexible delivery viewpoint, it represents a challenge in assessment from a standardisation standpoint.

The guidance around assessment of CCTs is simply to ensure that:

- the impact of the embedding strategy adopted at the classroom, departmental and school level is known and understood in terms of what has been learned.
- there is communication between schools, tutors and class teachers about the progress learners have made in coverage and acquisition of the CCT content.
- learners engage with each of the six CCTs with sufficient frequency, meaning and depth to allow them to achieve the key competencies they cover and to benefit from the new learning and skills each CCT introduces.

In each subject, educators may find it most beneficial to work with peers to determine the best-fit CCT opportunities, creating a support community to share development of resources and to help agree a consistent approach to teaching and assessment expectations when it comes to embedding the CCTs. Within this support community one can attempt to:

- agree which teaching approaches lend themselves to particular CCTs.
- share ideas and resource development.
- develop project-based approaches to SLO delivery that are enhanced by CCT inclusion.
- standardise assessment expectations around CCTs.

E. REPORTING PROGRESS

Learner and Parent/Guardian Reporting

Reporting on learning and progress should offer learners, parents, guardians and teachers insight into what learning expectations have been set, how the learner is progressing in relation to these learning expectations and how the learner can do what needs to be done to ensure continued progress and improvement as they go forward with their learning. Reporting should always be constructive, insightful and able to be used to stimulate meaningful discussion between the teacher, learner and their parent or guardian. It should, at the same time, be reflective, looking back at achievement, and forward-looking, focusing on improvement.

The LOF offers local flexibility for schools to decide how best to report information on learner progress, achievements and next steps within a clear set of national expectations. How frequent and what form such reporting takes are also decisions to be taken at the school and college level.

National expectations for reporting

Reporting will provide the learner, their parents or guardians with information on progress and achievement in each subject that includes:

- constructive, insightful and clear feedback throughout the learning experience.
- feedback on the learner's particular strengths, areas for development and completed achievements.
- feedback on the different curriculum areas.
- the particular support the learner is receiving to help them progress.
- attitude of the learner to learning.
- how home can play an active part in supporting the learning process.
- an opportunity to capture the learner's voice.
- an opportunity for parents/guardians to respond directly to the reporting feedback.

It is important that the reporting structure used is manageable for teachers.

Reporting is based upon the assessment of progress and there is a balance to be struck between how often assessment of progress is made and how often this progress is recorded and communicated to the learner and the parent/guardian. The reporting needs of the two groups are different:

- Learners should be receiving feedback on progress on an ongoing basis as a routine part of the learning and assessment process. The use of formative assessment (often called Assessment for Learning) should be a routine part of any assessment strategy. This makes this type of reporting frequent and continual.
- Parents and guardians need to be kept informed of their child's progress at key points in the learning journey where there needs to be feedback given around achievement and a discussion instigated between home and school about how further progress and improvement can be made. This makes this reporting much less frequent but recurring. At the very least, achievement of a level should be reported every time a level is achieved.

Reporting process

It is important to set up a process by which learners can take some ownership of what is reported. Educators should consider working with learners to determine which evidence should be drawn upon to summarise learning and progress for the purposes of reporting. This will invite reflection and dialogue about their learning and will be a useful opportunity to help the learner engage more deeply and meaningfully in discussion about their own learning. This type of dialogue will not restrict or impinge upon educators' professional judgements but will offer them some insight into the learner point of view and may help deepen their understanding of the impact of their own learning strategies.

The LOF offers the ability to report progress within the subject at different levels of detail. Each subject is broken down into levels, containing Subject Foci and each Subject Focus is further broken down into SLOs. With the SLOs making the outcomes of learning explicit, it will be important to establish what the learner, parent/guardian needs to know about progress against the SLOs and what can feasibly be shared, how often and when. Educators will first need to separate out internal reporting needs to chart a learner's progress, so that this can be shared with other teachers as they progress in other subjects, to benchmark progress more widely. Different audiences will need different details about learner progress.

The school and the relevant department need to set the policy on how they intend to report.

Internal Reporting

In order to maximise the opportunities that the LOF brings in terms of flexibility and freedom to help learners progress towards the learning expectations, the teacher will need to have a detailed appreciation of what the learner has already achieved and just how they relate to the learning expectations that the teacher is responsible for teaching. The teacher who comes next will also expect an appraisal of learner performance. It will be important to establish, through discussion with colleagues, how best to manage this internal communication and reporting in order to ensure a balance between what is helpful and insightful in assisting with the transition process and what is unwieldy, onerous and unmanageable.

It is important to remember that the detail that can be created around individual performance does not necessitate or promote an individualised teaching programme for each learner. Instead it is there to be used to facilitate a more responsive approach to curriculum design and more appropriate selection of teaching strategies and resource selection within the class.

As learners progress through the LOF, moving from level to level, year to year and class to class they will progress at different rates. This represents a challenge if learning is to remain fluid and continuous and progression is to be uninterrupted. That said, the Subject Foci and SLOs allow teachers to profile progress and achievement and to communicate that progress in a regular manner, indicating where the learner sits in relation to the overall expectations of a level, even indicating where there is some achievement beyond the level. The school is given the flexibility to decide how best it wants to communicate learner progress within the school and between those responsible for their learning and progression. Within the subject teaching team it will be important to identify an approach that is functional and clear within the subject and will ultimately maximise the Learning Outcome Framework's ability to chart progress in detail and in a personalised, learner-centric way.

A simple Achieved/Not Yet Achieved is clear feedback, yet it does not convey how close or far from being able to demonstrate achievement of the SLO the learner is. Educators may find it useful to come up with a convention that does more than just use a binary method of reporting achievement. Communicating more information about how a learner is relating to a particular level helps instigate discussion of where there may be particular learning challenges or where a learner has only started the learning associated with particular Learning Outcomes.

Evidence informing reporting should be drawn from a range of sources, including formal and informal assessment interventions, and educators should apply their professional judgement to a sufficient and robust body of evidence that allows them to report with confidence about progress made against a significant body of learning. Formal summative assessment interventions need to be subject to collaborative design and development and feature a measure of quality assurance and moderation to ensure what is reported is benchmarked against a wider understanding of the national standard.

How it is done elsewhere

The Scottish *Curriculum for Excellence* frames progression in relation to the learning expectations as developing, consolidating or having secured the learning objectives. These are not rigid categories but signposts indicating where the learner sits in relation to the expectations.

Typically, a learner who has started to engage in the work of a new level or area and starting to make progress in an increasing number of outcomes is at the Developing stage.

Once the learner has achieved a measure of breadth across the Subject Foci; can apply the learning in familiar situations; is beginning to show increased confidence by engaging in more challenging learning; and is starting to transfer their learning to less familiar contexts, they are engaged in a process of Consolidation.

Once significant achievement across the Subject Foci and outcomes has been recorded and there has been consistent success in meeting the level of challenge within the outcomes; learners are engaged in more challenging work; and are confidently transferring their learning and applying it in new and unfamiliar situations, their position in relation to expectations is viewed as Secure.

Adapted from *Building the Curriculum 5, A Framework for Assessment: Reporting*,
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Appendix



Digital Literacy

Digital literacy has become essential for learning and life. Besides cutting across various disciplines it must now be considered as being a discipline of its own such as music, art, science and literature. Digital literacy education seeks to equip learners with the competencies (knowledge, skills and attitudes) in the use of digital technology needed to access learning opportunities, to pursue their chosen careers and leisure interests and to contribute to society as active citizens. It also aims to provide them with knowledge of the principles underpinning these technologies and a critical understanding of the implications of digital technology for individuals and societies.

Digitally literate learners learn to become independent, confident and discerning users of technology. Subsequently they acquire and develop critical and analytical attitudes to appropriately choose the right digital tools according to specific needs.

Digital literacy includes five categories of digital competencies, namely: Information Management, Communication and Collaboration, Digital Media, Using Digital Tools for Learning, Management of the Internet.

The competence in information management enables learners with the means to access, evaluate and analyse and hence make an informed choice from a range of available data and information sources. Competencies relating to Communication and Collaboration empower learners to learn to communicate, collaborate and network with others. Competencies in Digital Media enable learners to analyse messages mediated by digital media and to express themselves creatively across a range of digital media.

Digital literacy also involves competence in using digital tools in various media and in different modes of learning (autonomous, collaborative, exploratory, designing). Digitally literate learners will learn to be responsible and competent in managing the internet, keeping themselves safe and secure online, making informed choices over privacy, taking responsibility for their actions, respecting intellectual property, abiding by the terms and conditions of systems they use and respecting the rights and feelings of others. In teaching digital literacy, teachers should look for authentic, meaningful and socially inclusive learning opportunities which allow learners to apply and develop their skills, knowledge and understanding across the curriculum. Digitally literate learners should be able to undertake challenging creative projects, both individually and collaboratively comprising aspects from different competence categories.

Theme Learning Outcomes:

Information Management

- I am able to identify and articulate my information needs.
- I can find, select, use and combine information from a range of sources.
- I can safely and critically navigate between online sources and select information effectively
- I can navigate between online sources and select information effectively.
- I can create personal information strategies.

Communication

- I can communicate through a variety of digital devices and applications.
- I can adapt my communication modes and strategies according to the people I am communicating with.
- I can use different digital tools to share knowledge, content and resources.
- I can help others to share knowledge, content and resources.
- I know how to quote other people's work and to integrate new information into an existing body of knowledge.
- I can engage with on-line learning communities effectively.
- I can use digital technologies to participate in online citizenship.

Collaboration

- I can use technologies and media to work in teams and collaborate in learning.
- I can collaborate with others and co-construct and co-create resources, knowledge and learning.
- I can function well in digitally mediated Communities of Practice

Use of Digital Media

- I can review, revise and evaluate information presented in a range of digital media.
- I understand both how and why messages in digital media are constructed and for what purposes.
- I can examine how individuals interpret messages in digital media differently.
- I understand how values and points of view are included or excluded and how digital media can influence beliefs and behaviours.
- I understand the ethical / legal issues surrounding the access and use of digital media, including copyright, ownership, licensing and use of proprietary content or software.
- I can work creatively across a range of digital media and multiple systems to present information effectively to a given audience.
- I can edit and improve content that I had already created or that others have created, respecting and acknowledging the rights of the original author.
- I can express myself through digital media and technologies.

Managing Learning

- I can use various tools to manage my own learning.
- I can use various tools and approaches to collaborate with others in learning.
- I can use various tools to explore ideas, theories, relationships and procedures.
- I can use various tools to learn by designing digital objects.
- I can use various tools and approaches to reflect on learning.
- I can use various tools and approaches to evaluate what I have learnt.
- I can build and assess e-portfolios.
- I can work on multiple eLearning management systems and platforms.

Managing Internet Use

- I understand how the internet and the world wide web work and can use them for communication and collaboration.
- I am aware of and abide by the principles of netiquette.
- I know what constitutes plagiarism.
- I can protect my devices from online risks and threats.
- I can protect myself and others from possible online dangers (e.g. cyber bullying) by following appropriate privacy and confidentiality procedures.
- I am able to consider the social, cultural, religious and ethical implications of digital technology and can confidently communicate, share information, access and distribute content without infringing upon other peoples' intellectual property.
- I am aware of cultural diversity online.
- I can develop active strategies to discover inappropriate behaviour.
- I can create, adapt and manage one or multiple digital identities.
- I can protect my e-reputation.
- I can manage the data that I produce through several online accounts and applications to avoid health risks related with the use of technology in terms of threats to physical and psychological well-being.
- I recognise Cloud Computing as a converging technology on which I can work and save my material.



Education for Diversity

The National Curriculum Framework (NCF) acknowledges Malta's cultural diversity and values the history and traditions of its people. It acknowledges and respects individual differences of gender, colour, ethnic and social origin, language, religion or belief, political or any other opinion, membership of a national minority, birth, ableism, age or sexual orientation and geographical location. A curriculum that acknowledges the fact that diversity is a feature of Maltese society, as it is of nations across Europe and the world, that can contribute to national prosperity and social cohesion.

As a member state within the United Nations, Malta is a signatory to international human rights instruments including the Universal Declaration of Human Rights (1948), the European Convention for the Protection of Human Rights and Fundamental Freedoms (1950), the International Covenant on Civil and Political Rights (1966), the International Covenant on Economic, Social and Cultural Rights (1966) and the UN Convention on the Rights of the Child (1989). As a member of the European Union, Malta is legally bound by the EU Charter of Fundamental Rights.

These instruments set out international standards and commit Malta's government and people to democracy and to acknowledging that citizens and other residents have, and should enjoy, human rights without discrimination.

Consequently the NCF aims to help children acknowledge social justice and solidarity as key values in the development of the Maltese society and encourage young people to uphold fundamental democratic values and promote social justice.

Education for Diversity promotes an inclusive educational culture and challenges various educational processes such as decision making within schools, languages of instruction, methodologies used, learner interaction and learning resources. Education for Diversity ensures the inclusion of multiple perspectives and voices within the learning environment, provides spaces for learning about the languages, histories, traditions and cultures of non-dominant groups in a society, encourages team work and cooperative learning in multicultural, multi-ethnic and other diverse contexts, combines traditional and local knowledge and know-how with advanced science and technology and values the practice of multilingualism. In doing so, it encourages an understanding of global issues and the need for living together with different cultures and values.

Theme Learning Outcomes:

Self Awareness

- I am a person committed to democracy and understand that this means ensuring people of different views and cultures have their say and work together for a better society.
- I have a principled and ethical approach to life.
- I am committed to social justice and a democratic and inclusive society.
- I reserve judgement so that it may be made on a fair and rational basis.
- I strive to strike a balance between my rights and duties and those of others.

Social Change

- I uphold fundamental democratic values and work to promote social justice.
- I respect the different religious and humanist convictions, morals and beliefs that inform people's conceptions of right and wrong.
- I recognise unfairness, injustice and preferential treatment in daily life situations including racist, sexist and homophobic language and behaviour.
- I challenge expressions of prejudice and intolerance towards minorities such as racist, sexist and homophobic names, anecdotes and comments.
- I claim my rights and act on my duties knowing that my fellow learners and teachers have equal entitlement to their rights.
- I appreciate that the notion of 'identity' is complex and changing and limited as a concept in capturing who I am and that the idea of 'identities' is a more powerful way of understanding who I am and who others are.
- I attend and respond to my teachers and fellow learners and accept that they may have different points of view.

Communicating for Diversity

- I communicate with, work with and respect all of my fellow learners, teachers and adult helpers.
- I communicate with people who are different to understand how we are the same and to understand myself better.
- I strive to communicate effectively with others in a constructive, supportive and self-determined way.
- I can use effective language to challenge injustices and inequalities.
- I approach differences of opinion and conflicts of interest through dialogue, non-violent communication and consensus; where this fails, I am willing and able to use mediation.



Education for Entrepreneurship, Creativity and Innovation

While entrepreneurship, creativity and innovation can potentially be seen as being discrete attributes, it is perhaps more strategic to consider them as mutually reinforcing features of a more cohesive and singular aim: to ensure that the future citizens of Malta have the wherewithal to contribute to the sustainable prosperity of the nation in an increasingly competitive global economic and social contexts. The goals include the four main competence areas of personal and interpersonal skills, practical and cognitive skills. This more strategic vision reinforces the need for an approach to Entrepreneurship, Innovation and Creativity that permeates all aspects of the curriculum, while being clearly signposted to ensure that learners' entitlements are being met and that learning and teaching in relation to these themes can be quality assured.

The overall goals of entrepreneurship education are to give learners the attitudes, knowledge and capacity to act in an entrepreneurial way and to acquire the skills that will promote their lifelong employability in a rapidly changing commercial, economic and social environment. This includes becoming entrepreneurial citizens in other spheres beyond industry or employability. These goals require the development of the 'soft' generic personal and interpersonal skills fundamental to becoming entrepreneurial, as well as the fostering of the more discrete entrepreneurial knowledge and understanding required to pursue entrepreneurial endeavours and to possess an entrepreneurial mindset which is both creative and innovative.

Creativity is generally recognised as both an innate yet often under-developed quality in young people, as well as a practical skill that helps to unlock an entrepreneurial disposition. It is a skill that can be taught and that everyone can aspire to. It involves opening up young peoples' thinking processes in ways that help them to look at familiar things with a fresh eye, to identify and frame a problem and to generate solutions whilst using their imagination, knowledge and skills to explore new possibilities rather than established approaches.

The ability to be innovative and the confidence to look for innovative responses to opportunities or problems encountered is best nurtured in a safe, supportive environment where this type of approach is encouraged, recognised and rewarded. Such a pedagogy requires allowing learners time to reflect on a situation and tap their resources and imagination to develop plans and solutions. It also requires time for implementation of new processes and the application of new ideas. Teaching and learning for innovation might even include space to 'learn from failure'.

Theme Learning Outcomes:

Personal

- I can work effectively on my own.
- I am resilient and can persevere.
- I understand the importance of nurturing a positive self-image, self-esteem and self confidence.
- I recognise the importance of integrity and ethical values.

Interpersonal

- I know how to communicate my proposed strategies to others effectively.
- I am able to contribute to a team.
- I am able to take the lead.

Cognitive

- I am able to solve problems imaginatively and laterally.
- I am able to think critically.
- I am able to consider different perspectives.
- I can recognise that entrepreneurship and innovation should be underpinned by ethics and values relating to social justice and sustainability.

Practical

- I can turn creative ideas into action.
- I have a basic set of research skills.
- I am able to audit my own skills and interests in order to consider future academic and vocational career choices.
- I appreciate the importance that creativity and entrepreneurship have played in the development and progress of human society.



Education for Sustainable Development

Education for Sustainable Development (ESD) helps learners to develop the necessary competences (knowledge, skills, values, attitudes and behaviour) that enable them to become sustainable citizens. ESD empowers individuals to actively participate in decision making processes which are compatible with living within the environmental limits of our planet in a just, diverse, equitable and peaceful society.

ESD seeks to ensure that learners:

- Develop a sense of identity and belonging to their local, national, regional and global community.
- Are empowered to adopt their roles and responsibilities within a globally interdependent world.
- Understand and are empowered to address the real causes and consequences of unsustainable behaviour within the context of an interdependent and globalised world.
- Develop a future-oriented perspective that highlights the significance of their decisions, choices and actions on the quality of life of present and future generations.
- Are exposed to diverse learning environments using a broad array of educational experiences.
- Develop a holistic concept of the environment involving natural, social, economic, physical and cultural perspectives.
- Value and respect social, cultural and ecological diversity.
- Are committed to action to bring about change.

ESD should be achieved through a whole-school approach that involves the reorientation not only of the curriculum, but also of the school culture, the school campus management, the school community and the wider local community in line with sustainable development.

Learners should experience ESD through transformative pedagogies that facilitate ESD teaching and learning experiences that promote the acquisition of the knowledge, skills, values, attitudes and behaviours necessary to become active global citizens.

ESD should be a lifelong learning process involving a blend of learner-centred processes, such as participatory/ collaborative learning; problem-based learning; inter-disciplinary learning; multi-stakeholder social learning; critical and systemic thinking-based learning; action learning; learning outside the classroom; experiential learning; reflective evaluation and using relevant real-world contexts.

Theme Learning Outcomes:

Learning to Know

- I can explain how the natural, social, cultural and economic systems work and are interrelated.
- I can describe my role as a citizen within the local, national, regional and global context.
- I can recognise the relationship between understanding others and the wellbeing of all in the present and the future.
- I can identify the root causes of inequality and injustice and actions that lead to a better quality of life, equity, solidarity and environmental sustainability.
- I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change.
- I can recognise the importance of lifelong learning and use such learning experiences to approach new challenges and be in a better position to take informed decisions and evaluate their consequences.

Learning to Do

- I can communicate my ideas and present my opinions in thoughtful and informed discussions and decision making processes.
- I can critically assess processes of change in society and envision a more equitable and sustainable world.
- I can identify priorities and evaluate potential consequences of different decisions and actions.
- I am able to collaborate with people having different perspectives on dilemmas, issues, tensions and conflicts from different disciplines/places/cultures/generations.
- I can use the natural, social and built environment that surrounds me, as a context and source of learning.
- I can involve myself and others in real-world issues to bring about a positive difference.

Learning to Be

- I am a critically reflective person and am able to evaluate decisions, choices and actions.
- I am responsible for my actions and capable of anticipating, adapting to and facing change.
- I can reflect upon the consequences of my actions on present and future generations.
- I am sensitive to divergent disciplines and perspectives, cultures and minority groups, including indigenous knowledge and worldviews without prejudices and preconceptions.
- I am motivated to make a positive contribution to other people and their social and natural environment, locally and globally.
- I am able to creatively and innovatively take considered action and challenge assumptions underlying unsustainable practice.

Learning to Live Together

- I can live in harmony with myself, others and the natural world at a range of levels from the local to the global.
- I respect and value diversity and challenge social injustice.
- I have a future-oriented perspective for how I live my life as a citizen of the world.
- I actively engage myself with different groups across generations, cultures, places and disciplines.
- I can actively participate in processes and encourage negotiations for alternative sustainable futures.
- I will help others clarify diverse worldviews through dialogue and recognize that alternative frameworks exist.
- I will challenge unsustainable practices across educational systems, including at the institutional level.



Learning to Learn & Cooperative Learning

The aims of Learning to Learn are for learners to:

- Focus on learning processes as well as final performances.
- Hold a rich conception of learning and based on a personal conviction to manage own learning.
- Acquire a wide range of strategies for learning.
- Develop strategies to plan, monitor and review their own learning.
- Become competent in self-assessment.

Theme Learning Outcomes:

Social Learning

- I can appreciate diverse viewpoints and personalities.
- I am confident in discussing my views with others.
- I can follow the ideas of others and comment on their views.
- I can follow group discussions and collaboration and summarise what is being said or done.
- I collaborate with other learners as part of my learning.
- I learn by designing products with others.
- I seek out and am open for guidance and support from peers and adults.
- I am able to talk with others about learning.
- I listen to others talk about learning.
- I can discuss various subjects and learning strategies with peers.
- I can debate and support my argument without being judgemental while still empathising with others.
- I can learn about my needs to make the right choices.

Personal Learning

- I can identify the support and resources I need to learn.
- I am aware of my preferred way to learn and can use this to plan my own learning.
- I manage goals and time efficiently in learning.
- I feel competent in managing my own learning.
- I am open to feedback from others and am able to consider it for my personal improvement.
- I reorganise myself by explicitly changing my assumptions over time.
- I am able to follow my own interests as this helps me to reflect on 'who I am'.
- I am pleased when I succeed at difficult tasks.
- I believe that effort can lead to success.
- I reflect on my mistakes and learn from them.

Cognitive Learning

- I am able to remember by recalling, recognising and locating information.
- I am able to link new information to my existing knowledge.
- I am able to analyse information that I come across.
- I evaluate knowledge in terms of my learning objectives and my preferred way of learning.
- I am able to solve problems on my own and in collaboration with others.
- I am able to assess myself as this helps me to understand what I know and who I am.
- I assess myself to analyse and further develop my ideas.

- I assess my peers to compare what I know to what others know, gaining knowledge of what mental models others hold of a particular concept and how these mental models can evolve for understanding to happen.
- I am able to focus on the main subject and summarise important points.
- I am able to apply my knowledge and understanding in differing contexts.
- I can manage my own learning to improve important skills including literacy and numeracy skills.
- I understand that learning involves different processes.

Creative Learning

- I take initiative in designing new products.
- I am able to think about new ways of making good use of objects.
- I am able to use my imagination and creativity.
- I prefer to move on to challenging tasks rather than stay on easy ones.
- I am able to face new, challenging experiences and learn from them.
- I learn by exploring events, life experiences and the physical environment.
- I am able to engage in unplanned spontaneous play.
- I am able to engage in planned, purposeful play.
- I understand that I can improve and learn and that if I am stuck I can think upon my difficulties, solve my problems and move forward.



Literacy

One of the most important aspects of literacy in Malta is the implication that a literate person is fluent in both Maltese and English. An essential factor to ensure that Malta remains a bilingual country is making sure that its learners develop equal competences in reading, writing, speaking, listening and comprehending in both official languages from the early years, preferably from kindergarten. Another is ensuring that learners develop the skill to switch easily from Maltese to English (or vice versa) depending on the situational need. Achieving bilingual literacy in our education means that all our young people feel comfortable and confident using both languages.

Literacy development will require a whole-school approach that is clearly reflected in school policies where there is a conscious effort in which a community for literacy is promoted throughout the curriculum. Literacy for learning is an intrinsic part of school life and every subject domain can serve as a context whereby literacy skills development could be enhanced. Furthermore, schools should strive for a literacy rich environment using technology as a platform.

The relevance of reading aloud and presenting ideas to an audience and the opportunities for contextualised language and play acting (drama) should be clearly identified as components of spoken literacy across the curriculum. Stressing the importance of oracy is key to encouraging active learning cultures and communities.

With regard to reading, the fun and interactive aspect of reading is very important; the purpose of reading should initially be for fun/interest and communication. The value of entertainment in reading, which is closely linked to attitude and disposition to language, is crucial especially in the Early and Junior Years. Critical and creative thinking, where the learner increasingly takes control of texts in different domains and gains awareness, will follow.

Theme Learning Outcomes:

Listening and speaking

- I can converse in a range of situations, both formal and informal, matching register and language to the situation and audience.
- I can listen to and understand spoken text well and respond or apply the information appropriately with comments and/or questions.
- I can use language to present my thinking logically and clearly and can talk to engage an audience while analysing and evaluation through an open-ended approach.
- I can use spoken language to share my ideas in a collaborative way, appreciating the social elements of conversation such as waiting for my turn and listening to what others have to say.

Expressive language

- I can use expressive language to develop my own thinking, using words to explore, clarify and confirm ideas.
- I can use expressive language to develop my thinking and the thinking of others by contributing to the explorative talk of my peers and the dialogic talk of my teachers.
- I can use expressive language to organise and rehearse ideas, arguments and language structures in order to synthesise and evaluate before writing and while editing.

Reading and understanding

- I can decode print effectively and successfully establish multisensory linking and phonemic awareness between grapheme and phoneme.
- I can read text in a fluent manner and understand what is written, gain knowledge and enjoy the process.
- I can select real, virtual and multimedia texts to entertain and inform me, constructing meaning from text, using words and visual or audio information to confirm, complement or change what I already know while discarding the superfluous.
- I can approach texts purposefully: I am aware of what I hope to gain from them and am able to use retrieval devices, cross references and links to follow themes or ideas through various means including texts accessed via technology.
- I can select appropriate texts for my purposes, taking account of implied readership and provenance as well as subject matter and format.
- I can identify and follow the different reading conventions of my academic subjects, regarding the place and purpose of reading texts in learning and in questioning or accepting the authority of these texts.

Writing

- I can draw on what I have read, what I have done and what I have felt at home, at school and at play to inform my writing.
- I can convey my thoughts powerfully and eloquently through speech and text.
- I can select the appropriate language, register, genre and medium for the texts I write.
- I can use writing in both manuscript (handwritten form) as well as digital form in order to inform, to persuade and to entertain other people.
- I can use writing to consider ideas and to reflect on and consolidate my own thinking and learning. I can follow the writing conventions of the genres and subjects I am studying.

Accuracy

- I can write accurately using language conventions and rules such as those established by Standard English / Kunsill Nazzjonali tal-Ilsien Malti / I-Akkademja tal-Malti.
- I can use my knowledge of morphology as well as my phonological awareness and visual memory to attempt to spell unfamiliar words and recognise correct spelling.
- I can use a range of punctuation marks to make my meaning clear to a reader.

Planning and reflection

- I can plan my written work and think what I want to communicate before I start to write.
- I can understand the need for drafting; I can edit and proofread my work and allow sufficient time in which to complete a piece of work.
- I can reflect about my writing and think about how I learn best.



Learning Outcomes Framework

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