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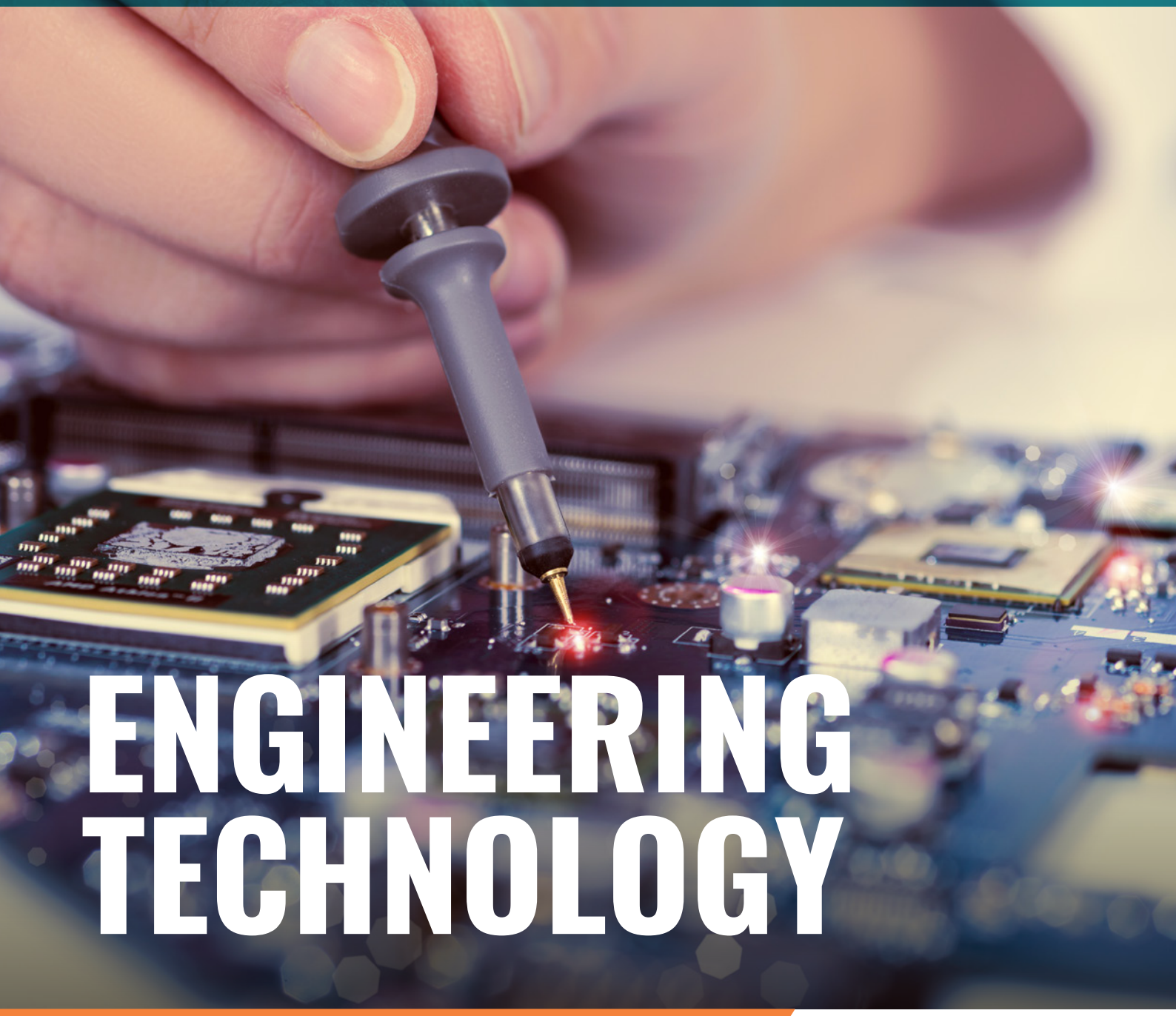
EUROPEAN SOCIAL FUND
MALTA 2007-2013

MINISTRY FOR EDUCATION AND EMPLOYMENT
PARLIAMENTARY SECRETARIAT
FOR THE EU PRESIDENCY 2017 AND EU FUNDS

EDUCATORS' GUIDE FOR PEDAGOGY AND ASSESSMENT

USING A LEARNING OUTCOMES APPROACH



ENGINEERING TECHNOLOGY

FORMS 3 4 5

Learning Outcomes Framework

Learning Outcomes Framework

This document is part of the ESF1.228 Project entitled 'Design of Learning Outcomes Framework, associated Learning and Assessment programmes and related Training' implemented under the Operational Programme II – Cohesion Policy 2007-2013 and was part-financed by the European Union European Social Fund co-financing rate: 85% EU Fund; 15% National Funds.

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Ministry for Education and Employment,
Great Siege Road, Floriana VLT 2000
Malta

Publisher: Directorate for Quality and Standards in Education

Graphic design: Outlook Coop

Contents

Introduction

Following the endorsement of the National Curriculum Framework (NCF) in 2012, an ambitious plan was launched the aim of which was to put 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 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.

A number of other local policy documents published in the 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), Education for All: Special Needs and Inclusive Education in Malta (2014d), Malta National Lifelong Learning Strategy 2020 (2015) and Respect for All Framework (2014) all point towards the need of proving equitable opportunities for all learners to achieve educational outcomes at the end of their schooling which 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. 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.

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 learners attending different schools, decrease the number of low achievers, raise the bar in literacy, numeracy and science and technology competence and increase learner 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 a correct value judgement 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 alterations and apply interesting and realistic contexts that are personally meaningful to them.

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

THE LEARNING AND ASSESSMENT PROGRAMME FOR ENGINEERING TECHNOLOGY

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

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** - the learning outcomes are written in a way that informs pedagogy and, in conjunction with the assessment strategies related to each outcome, set clear assessment expectations. This document sets down good practice teaching and assessment guidelines which educators may wish to take on board and adapt to meet the needs of their learners.

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, the University College London Institute of Education and 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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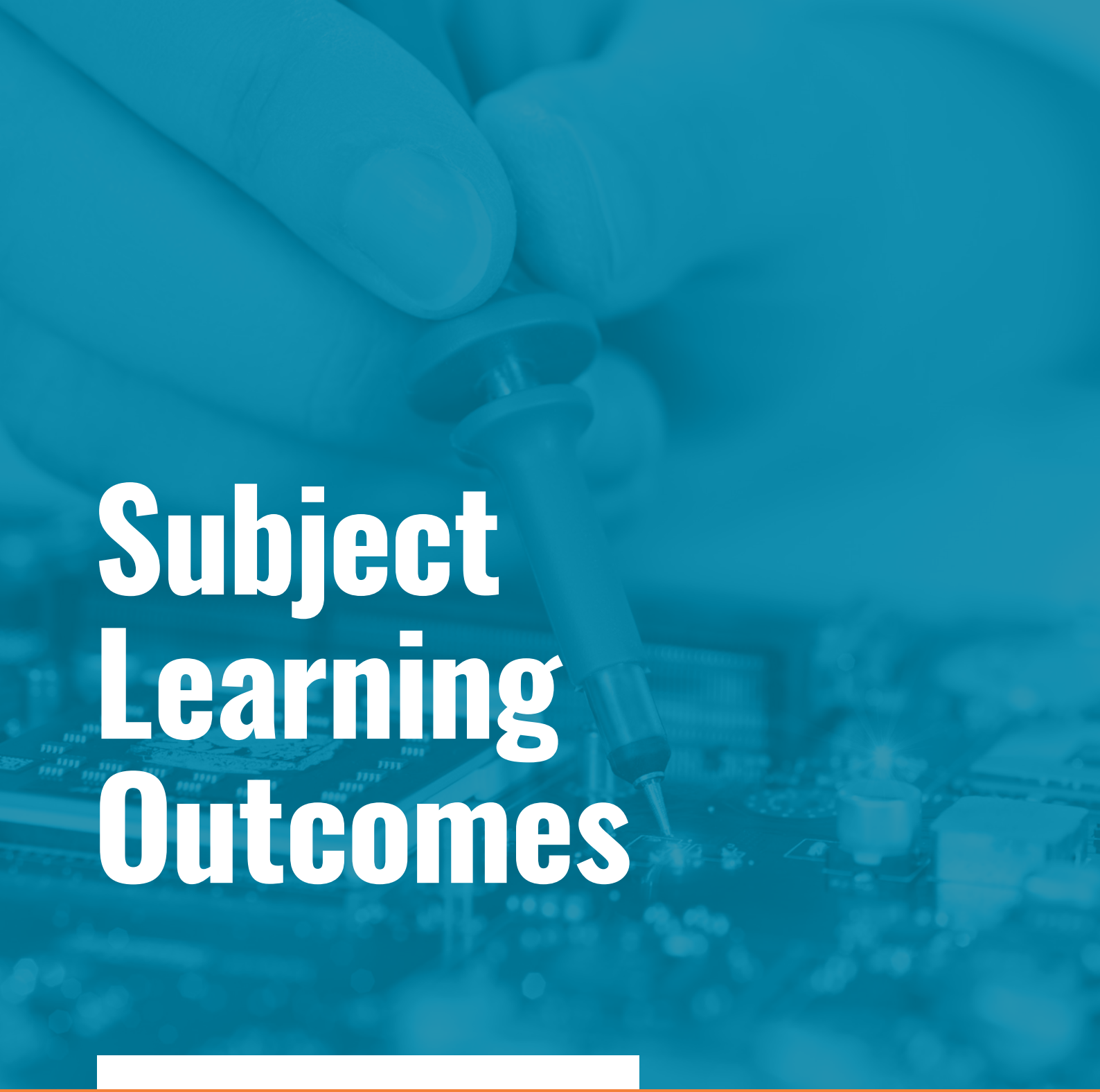

Subject Learning Outcomes

ENGINEERING TECHNOLOGY

FORMS 3 4 5

The Subject Learning Outcomes (SLOs) for Engineering Technology span from Form 3 to Form 5.

FORM 3

1. Working Effectively and Safely in Engineering

Subject Focus: 1. I can prepare the necessary PPE's according to statutory regulations for a given engineering task.

K 1 I can list personal and protective equipment related to engineering environment.
Personal and Protective Equipment: e.g. overalls, protective footwear, eye protection, mask/respirators, harnesses, hard hats, hand protection.

K 2 I can describe the functions of PPEs for a specific task.
CREATIVE LEARNING

K 3 I can identify warning signs for the nine main groups of hazardous substances.
Groups of hazardous signs: gas under pressure; explosives; oxidizing; flammable; corrosive; health hazard; acute toxicity; serious health hazards; hazardous to the environment.

- Typical hazardous substances:
- Gas under pressure: *e.g. aerosols, oxy/acetylene, compressed air;*
- Explosives: *e.g. fuels, gas cylinder, fireworks;*
- Oxidizing: *e.g. bleach, sulphuric acid, nitric oxide, caustic soda;*
- Flammable: *e.g. fuels, organic materials, gases;*
- Corrosive: *e.g. acetic acids, hydrochloric acid, ferric chloride, sodium hydroxide;*
- Health hazard: *e.g. detergents, coolant fluids, cleaning agents;*
- Acute toxicity: *e.g. lead, biocide, methanol;*
- Serious health hazards: *e.g. petrol, lamp oil, turpentine;*
- Hazardous to the environment*: e.g. mercury, diesel, turpentine.*

K 4 I can relate the statutory regulations to a given engineering activity.
COGNITIVE LEARNING
Local legislations: e.g.

- *Act 27 of 2000 Occupational Health and Safety Authority Act,*
- *Legal notice 44 of 2002 Work Place (Minimum Health and Safety Requirements) Regulations,*
- *Legal notice 45 of 2002 Work Places (Provision of Health and/or Safety Signs) Regulations,*
- *Legal notice 36 of 2003 General Provisions for Health and Safety at Work Places Regulations,*
- *Legal notice 227 of 2003 Protection of the Health and Safety of Workers from the Risks related to chemical Agents at Work Regulations,*
- *Legal notice 121 of 2003 Minimum Requirements for the use of Personal Protective Equipment at Work Regulations,*
- *Legal notice 35 of 2003 Protection against Risks of Back Injury at Work Placement Regulations.*

C 1 I can explain the importance of using suitable packaging and labelling in relation to dangerous substances.
COGNITIVE LEARNING
Materials, places and conditions used to store dangerous substances: e.g. plastic, metal, secured cabinets, temperature conditions.

A 1 I can prepare the necessary PPEs needed for an engineering task referring to local health and safety regulations.
PRACTICAL

1. Working Effectively and Safely in Engineering

Subject Focus: 2. I can carry out risk assessment within an engineering environment.

K 5 I can outline the various hazards that might exist in an engineering environment.
Hazards: e.g. mechanical, electrical and electronic, physical, chemical, ergonomic, environmental.

K 6 I can list the key areas of a risk assessment including to whom this report should be given.
COGNITIVE LEARNING
- *Identify the hazards: identifying hazards that could cause risk in everyday activity;*
- *Decide who might be harmed and how;*
- *Estimate the risk: scale of risk; concept of likelihood of risk; degree of possible harm for different people;*
- *Controlling risks: possible actions to remove risks completely or to control them so the risk of injury is limited;*
- *Monitoring effectiveness of controls: instructions for controlling risks; implementing controls; regular review of risks and controls;*
- *Record Keeping;*
- *Review risk assessment;*
- *Persons: Health and Safety Officer; Employer.*

K 7 I can describe the necessary procedures to help a person when an incident occurs in an engineering workshop.
COGNITIVE LEARNING
Personal Incidents: e.g.: Cuts/wounds, electric shock, unconsciousness, physical/chemical burns, sprains and strains, fractures, foreign object in the eye.
Fire:
- *Classes of fires;*
- *Different types of extinguishing fire devices: e.g. fire blanket, different types of fire extinguishers.*

C 2 I can explain risks in terms of the hazards present in an engineering environment.
CREATIVE LEARNING
Risks: Damage to equipment; harm to self; harm to others.

C 3 I can explain preventative measures required for maintaining a safe work environment during an engineering activity.

COGNITIVE LEARNING

Preventative Measures:

- Mechanical: *e.g. wear the appropriate PPE, use the suitable tool for the proper job, visual inspection of the tool, work to laid-down procedures, do not remove or disable guards, do not remove safety devices on machinery;*
- Electrical and electronic: *e.g. wear the appropriate PPE, check for wear on electrical cords, check appropriate fuse rating;*
- Physical: *e.g. wear the appropriate PPE, do not wear jewellery, tie loose hair, remove loose clothing, proper ventilation, use sunblock in direct sunlight;*
- Chemical: *e.g. wear the appropriate PPE, protect from direct sunlight, obtain special instructions before use, do not spray on an open flame, wash thoroughly after handling, store chemicals in a safe place, report and do not use unlabelled containers;*
- Ergonomic: *e.g. adjust workstations, proper lifting techniques, adopt good posture, avoid repetitive work movements, take frequent breaks, use appropriate tools to enable neutral posture;*
- Environment: *e.g. permit to work, inspection of site dangers, hand rails, make sure that scaffolds are certified, do not touch bare conductors, good housekeeping, follow signs, adhere to symbols and colour codes, good ventilation, follow lock out-tag out procedures.*

A 2 I can carry out a risk assessment before engaging in an engineering activity.

PRACTICAL

1. Working Effectively and Safely in Engineering

Subject Focus: 3. I can interpret and use engineering documentation.

K 8 I can distinguish between different engineering information.

Engineering Information:

- *Block diagrams; flow charts;*
- *Exploded views;*
- *Schematic diagrams: component drawing; circuit drawing;*
- *Assembly diagrams: general assembly; sub-assembly; fabrication assembly; repair and maintenance diagram.*

K 9 I can identify mechanical colour codes, symbols and abbreviations from given documentation.

Symbols, Abbreviations and colour codes:

Mechanical Colour Codes

- *Colour Codes:*
  - *Industrial Cylinder Colours: e.g. oxygen, acetylene, nitrogen, helium, argon, carbon dioxide;*
  - *Pipe Marking: e.g. drinking, chill, cold, hot, fire extinguishing, sea untreated, hydraulic, diesel fuel, compressed air, drainage, steam;*
- *Mechanical symbols and abbreviations:*
  - *Metals: e.g. cast iron, mild steel, stainless steel, aluminium, lead, copper;*
  - *Welding: e.g. spot weld, square butt weld, fillet weld;*
  - *linear and geometric: e.g. radius, diameter, projection, straight line, dashed lines, centre line, hidden lines, construction lines.*

K 10 I can identify electrical colour codes, symbols and SI units from given documentation.

Symbols, Abbreviations and colour codes:

- *Electr*ical and electronic colour codes: flexible cords used for direct current; resistors.
- Electr*ical and electronic symbols and SI units:*
  - *Electrical terms: e.g. voltage, current, power, resistance, capacitance, inductance.*
  - *Passive components: e.g. resistor, capacitor, inductor.*
  - *Semiconductors: e.g. diodes and LEDs, operational amplifiers, transistors and MOSFETS.*
  - *Sensors: e.g. light dependent resistor LDR, thermistor, microphone.*
  - *Actuators: e.g. D.C. motors, relays, buzzer.*
  - *Integrated circuits: e.g. logic gates (AND, OR, NOT), NE555, voltage regulators.*
  - *Sources: e.g. batteries, power supplies, solar cells.*
  - *Switches: e.g. SPST, SPDT, DPDT.*

C 4 I can discuss the need for reading and interpreting engineering information accurately.

READING AND UNDERSTANDING

Need for reading and interpreting engineering information: Work to laid-down procedures; produce accurately the required task; health and safety reasons; to safeguard the equipment being used; communicate ideas to others; priority setting.

C 5 I can explain measures needed in order to properly store and re-use engineering documentation.

COGNITIVE LEARNING

Types of documentation: e.g. manuals, data sheets, job cards, test schedules, quality control documentation, work permits, injury reports, risk assessments.

Document care and control:

- *Location and sec*urity: e.g. ap*propriate storage conditions, access point procedures, return procedures, reporting discrepancies in data and documents;*
- *Physical handling: e.g. damage and effects from graffiti, damage and effects from normal usage, cleanliness, folding methods;*
- *Document control: e.g. issue dates, amendment dates, reporting of loss/damage.*

Legislation: Data protection.

A 3 I can carry out an assembly task from given engineering information.

PRACTICAL

FORM 4

2. Using Engineering Tools and Materials

Subject Focus: 1. I can understand the properties of different types of engineering materials and manufacturing processes.

K 1 I can describe the difference between metals.

Ferrous metals:

- *Material steel: e.g. mild steel, carbon steel; wrought iron;*

Non-ferrous metals:

- *Material: e.g. aluminium; copper; lead;*

Alloys:

- *Ferrous alloys: e.g. nickel; cast iron; stainless steel;*
- *Non-ferrous alloys: e.g. brass; duralumin; solder.*

Differences:

- *Ferrous metals: e.g. contain iron; harder than non-ferrous material; rust;*
- *Non-ferrous metals: e.g. can be used to protect ferrous materials; protection against elements; corrosion;*
- *Alloys: e.g. mixture of ferrous and non-ferrous material; mixture according to industry needs.*

K 2 I can describe the difference between woods.

Hard wood:

- *Material: e.g. mahogany, oak, balsa wood, beech, walnut, cherry;*

Soft wood:

- *Material: e.g. pine, juniper.*

Manufactured wood:

- *Material: e.g. veneered, chipboard, plywood, block board, medium density fibreboard, oriented strand board.*

Differences:

- *Hard wood: loose leaves during the cold wood, broad leaves.*
- *Soft wood: evergreen trees, needle leaves, cheaper in price than hard wood, faster growth rate.*
- *Manufactured wood: can be manufactured according to industry needs, made from recycled natural wood, cheaper in price than natural wood, does not have live characteristics as natural wood.*

K 3 I can describe the difference between polymers.

Thermosetting polymers:

- *Material: e.g. polyurethane, polyesters, vulcanized rubber, Bakelite, epoxy resin, melamine, silicones.*

Thermoplastic polymers:

- *Material: e.g. polyethylene, polypropylene, polystyrene, acrylic, ABS, PET, PVC.*

Differences:

- *Thermosetting polymers: once set cannot be reset, during manufacturing these transform from liquid to solid, if exposed to heat these materials degrade rather than melt.*
- *Thermoplastic polymers: once heated to the ideal temperature can be reset, during manufacturing these transform from granules or powders to the actual object with the help of heat.*

K 4 I can describe the function and types of smart material.

Types of smart materials: piezoelectric; shape memory alloys/polymers; magnetic shape memory; self-healing material.

Function: have one or more properties that can be significantly changed by certain conditions such as: stress, temperature, moisture, PH, electric or magnetic fields.

C 1 I can explain the properties of different materials needed for particular applications.

Properties: e.g. hardness, ductility, malleability, resistance to environmental degradation, strength, elasticity.

C 2 I can explain the different manufacturing processes of different materials.

Processes:

- *Metal Processes: Annealing; hardening; galvanizing; electroplating.*
- *Wood Processes: seasoning; wood joints; bending; finishing.*
- *Polymers:*
  - *Thermoplastic processes: vacuum forming, line bending, injection moulding, blow moulding, rotational forming,*
  - *Thermosetting processes: casting.*

2. Using Engineering Tools and Materials

Subject Focus: 2. I can carry out tests to identify engineering material for specific needs.

K 5 I can outline the different tests that can be carried out on materials.

Different tests: hardness; tensile; compression; shear; temperature; torque; impact; environmental degradation.

C 3 I can justify the test that needs to be conducted on given materials for a particular scenario.

A 1 I can carry out different tests in order to select an engineering material according to a given scenario.

 CREATIVE LEARNING

2. Using Engineering Tools and Materials

Subject Focus: 3. I can choose appropriate forms of supply to manufacture an engineering component.

K 6 I can identify the forms of supply available for engineering materials.

Forms of Supply:

- *Metals: bar; sheet; pipe/rod; wire; castings; forgings; mouldings; extrusions; powders.*
- *Woods: planks; sheets; dowels; mouldings; beams.*
- *Polymers: film/sheets; pellets/ powders; extrusions; castings; pipe/rod; liquid.*

C 4 I can justify the appropriate forms of supply of different materials for given engineering components.

 COGNITIVE LEARNING

2. Using Engineering Tools and Materials

Subject Focus: 4. I can make use of different tools safely and appropriately to produce an engineering component.

K 7 I can outline the functions of different measuring and marking out tools.

- *Marking out tools: e.g. scriber, centre punch, chalk line, dividers/callipers, surface plate, trammel, blueing or paint, scribing block, mortise gauge.*
- *Measuring tools: e.g. ruler, measuring tape, protractor, gauges, veneer calliper, micrometre, engineer square, sliding bevel, combination sets.*

K 8 I can outline the functions of different hand tools.

Hand tools: hammers/mallets; pincers; pliers; saws; screwdrivers; files; spanners and sockets; chisels; planer; taps and dies.

K 9 I can outline the functions of different power tools and machinery.

Power tools and machinery: drills; lathe; sanding machines; band saw; strip wire heater; hot air blowers; vacuum former; angle grinder; cross cut; jigsaw/scroll saw.

K 10 I can describe the appropriate use, maintenance and care of different tools.

Different tools: marking out tools; measuring tools; hand tools; power and machinery tools.

C 5 I can justify the choice of tools to be used to manufacture a particular engineering component.

A 2 I can use tools to carry a measuring and marking out activity on sheet material from given information.

 PRACTICAL

A 3 I can use different tools appropriately to produce a 3D engineering component from given information.

 PRACTICAL

FORM 5

3. Electronic Circuits Designs

Subject Focus: 1. I can interpret the different representations of circuits.

K 1 I can identify different electronic components from their schematic, pictorial and real life representation.

Different electronic components:

- *Passive components: e.g. resistor, capacitor, inductor;*
- *Semiconductors: e.g. diodes and LEDs, operational amplifiers, transistors and MOSFETS;*
- *Sensors: e.g. light dependent resistor LDR, thermistor, microphone;*
- *Actuators: e.g. D.C. motors, relays, buzzer;*
- *Integrated circuits: e.g. logic gates (AND, OR, NOT), NE555, voltage regulators;*
- *Sources: e.g. batteries, power supplies, solar cells;*
- *Switches: e.g. SPST, SPDT, DPDT;*
- *Connectors: e.g. BNC, IC base, screw-type and spring-type PCB connectors.*

K 2 I can identify sub-circuits from their schematic, pictorial and real life representation.

Sub-circuits: Potential divider; bridge network; timing circuits; gain/attenuation block.

K 3 I can classify components into categories.

K 4 I can predict the value of components in a circuit by using basic laws of electricity.

COGNITIVE LEARNING

Basic laws of electricity: V=IR; P=IV; Resistors and capacitors in parallel and series; T=RC.

C 1 I can describe the behaviour of individual components

Individual Components: resistor; LDR; capacitor; diode; operational amplifier; transistor; relay; motor; logic gates; battery; solar cell; SPDT.

C 2 I can interpret characteristic curves of individual components.

COGNITIVE LEARNING

Individual components: resistors; diodes; transistors.

C 3 I can discuss the function of a sub-circuit in relation to the characteristics of its individual components.

Sub-circuits: e.g. potential divider, bridge network, timing circuits, gain/attenuation block.

A 1 I can translate a schematic diagram of a circuit to its prototype equivalent both pictorially and physically.

PRACTICAL

One of the following circuits: Amplifiers, Timers or Oscillators, Filters, Sensing circuits, Actuating circuits, Audio or Visual indicator circuits.

3. Electronic Circuits Designs

Subject Focus: 2. I can test and find faults in circuits.

K 5 I can identify tools and equipment used to construct circuits.
Tools and equipment: soldering iron; wire stripper; side cutter; long nose pliers; third hand; de-soldering pump; solder wick; track cutter.

K 6 I can label test bench equipment and settings.
PRACTICAL
Test Bench Equipment: multi-meter; oscilloscope; signal generator.

K 7 I can describe basic voltage, current and resistance tests.

C 4 I can justify the use of test bench equipment in relation to differrent scenarios.

A 2 I can fault-find a circuit using a multi-meter.
PRACTICAL
Faults: e.g. missing or misplaced or incorrect components, missing jumpers or footprint pads, miscalculated components or misoriented components.

3. Electronic Circuits Designs

Subject Focus: 3. I can construct electronic circuits.

K 8 I can identify different electronic boards and their parts.
Electronic boards: breadboard; strip board; PCB.
Parts: bus lines; terminal strips; copper tracks; insulation layer; photo resist layer.

K 9 I can describe the process of constructing a printed circuit board.
Process: drawing of the artwork (with or without software); chemical development of PCB; etching of a PCB; populating the PCB.

K 10 I can describe the soldering processes for prototypes and mass produced circuits.
Soldering processes for prototypes: cleaning of soldering iron tip and board; preparation of surfaces to be soldered by tinning; applying solder; finishing.
Soldering processes for mass produced circuits: silk screening; surface mount components; soldering baths; robotic assembly.

C 5 I can identify the advantages and disadvantages of electronic boards.
Electronic boards: breadboard; strip board; PCB.

A 3 I can manufacture a printed circuit board using the chemical process.
PRACTICAL
Manufacturing: drawing of the artwork (with or without software); safe handling of chemicals using the appropriate PPEs and procedures; chemical development; etching of a PCB; populating the PCB.

Pedagogy

A. PEDAGOGY AND GOOD PRACTICE LEARNING

> *'The introduction of vocational education aims to broaden and enrich the secondary education curriculum through the adoption of teaching and learning methods that move away from formal learning to a progression process based mainly on practical training and tasks based on real-world problem-solving, experiential learning closely related to work, written assignments, portfolios and on-going assessment.'*
>
> Briefing session for Vocational Subjects Local Experts, June 2015

The vision for the LOF vocational subjects encompasses a new pedagogy where the learner is at the centre of learning. It is envisaged that the Engineering Technology vocational programme in secondary schools will be a three-year optional subject starting in Year 9 (Form 3) and forming part of the entry requirements into post-secondary education institutions such as MCAST.

The aim of the vocational programme in Engineering Technology is to provide learners with the underpinning knowledge related to the subject in line with the Malta Qualification Framework specified at MQF Level 3. By the end of the programme, learners are expected to have gained sufficient skills and should be able to apply their knowledge.

The programme - originally basing itself on BTEC rails and now shifting to home-grown - should contain a balance between theoretical and practical competencies in the subject, as its aim is to gradually introduce learners to the practical world of work. Thus, qualities such as creativity, logical thinking, accurate planning and an attention to detail are of intrinsic value. The ability to work in a group should be promoted, as should aspects such as innovation and entrepreneurship while keeping in mind environmental issues.

Being vocational, such a programme should strengthen future employability skills and target what the industry needs. The programme should entice learners to continue training without necessarily limiting them to one particular discipline. Specialisation will come at a later stage.

Ideally, knowledge is to be presented in a vocational context in an applied and practical way. Learners should be encouraged to apply underpinning theories in their research and analysis.

Educators are encouraged to invite guest speakers specialised in particular areas to help learners better understand the topic.

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 educators' role in the lives of their learners. Educators play a crucial role in guiding their learners towards their goals and shaping their perceptions (European Commission, 2015).

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. Curriculum planners at all stages should regularly consider the opportunities presented by the SLOs to develop active learning throughout the forms in the Learning Outcomes Framework.

Engineering Technology Overview

The Engineering Technology VET course consists of three units. Each unit should be covered in a specific scholastic year; i.e. Unit 1 in Form 3, Unit 2 in Form 4, and Unit 3 in Form 5.

Each unit has between three to six Learning Outcomes which are assessed through 18 Assessment Criteria which are divided into three groups :

- 10 Knowledge criteria
- 5 Comprehension criteria
- 3 Application criteria.

Each Knowledge criterion carries 4 marks, a Comprehension criterion carries 6 marks and an Application criterion carries 10 marks.

For each unit there are three assessments, two of which are set by the educator while the other is a controlled test set by the official examination board (MATSEC). Each of the first two assessments should carry between 26 and 34 marks, while the controlled assessment should carry between 38 and 42 marks. The grading criteria to be assessed in the controlled test will be specified at the beginning of the scholastic year, and the controlled assessment will take place at the end of that scholastic year. Each grading criterion should be assessed only once. All assessments should be internally and externally verified, and each assignment should be accompanied by a marking scheme so that the assessment is valid, fair and reliable.

The maximum mark that can be obtained for any unit is 100, and candidates who obtain 50 or above will pass the unit. Learners must attempt all assignments in order to pass the unit. Learners who obtain an accumulation of 50 marks or more on completion of the three assignments for a given unit will not be eligible for a resit to better their original mark. However, those who fail will be given the opportunity to sit for a synoptic assessment at the end of the scholastic year.

The synoptic assessment will cover all the learning outcomes of that unit. The maximum mark that can be obtained in the synoptic assessment for a learner who failed the unit is 60%. However, if a learner was absent for the controlled assessment for a justified reason, then the learner can achieve the maximum mark allocated for the controlled assignment. Learners can appeal the mark of the whole unit.

If learners pass the three units they will achieve an MQF Level 3 qualification, while if learners pass only two units and achieve between 120 and 149 marks they will get an MQF Level 2 qualification.

Under each grading criterion, the educator can find all the content that has to be covered before learners are assessed. One should note that in the Learning Outcomes Framework one can find the following conventions used: the semi-colon (;), comma (,) and example (e.g.).

When a semi-colon is used between each item on the list (as in the example below) the educator should assess the learners on all the content prescribed:

- I can describe how staff can control risks to service users.
  Different types of risks: physical; psychological; social.

When the list is headed with example (e.g.) a comma (,) is used to separate the items on the list. This indicates that the educator should still cover all the content but expect the learners to give more than 50% of the content prescribed for that grading criterion (as in the example below):

- I can identify the skills needed for effective communication.
  Verbal: e.g. greeting, checking for understanding, open-ended and close-ended questions, empathy, confrontation, constructive and destructive feedback, summarisation, termination.

Educators are thus expected to teach all aspects of verbal communication, but learners are expected to give five examples in their assignment.

In each grading criterion there is a command verb which specifies the level of content expected by the learner; such as 'list', 'identify', 'outline', 'describe', 'explain' etc. These verbs are defined by MATSEC in the glossary of verbs available on their website.

Each assignment is internally verified before it is given to the learner and after being corrected by the educator. External verification is carried out twice yearly.

By the end of the Engineering Technology VET programme, learners should be able to achieve the following competencies in these sectors:

Form 3	**Working effectively and safely in engineering workshop technology.** The unit introduces effective and safe work to learners, focusing on their wellbeing, on prolonged life of tools and equipment and on economic aspects of work. The primary goal of the unit is to introduce basic work practices in engineering and the potential hazards involved. The learner will be introduced to EU regulations adopted for engineering activities and for vocational training. This unit provides learners with knowledge of material and equipment handling, as well as the use of appropriate personal protective equipment (PPE) and their classification: protection of respiratory organs, skin, eyes and hearing; protective clothing and ensembles. Learners will become aware of the hazards and risks associated with different engineering tasks, working environments (for example, working with high voltages, and static-sensitive devices), use of tools and equipment (both common and special) and working with dangerous materials and substances. The unit covers ways of avoiding hazards, and ways to respond correctly and swiftly in case of an incident both in theory and in practice. The knowledge required during the health and safety section can also be applied in everyday life. The learner will be equipped with suitable communication skills for working in a team.

Form 4	**Mechanical engineering workshop technology, representations, materials and tools.** This unit aims to provide learners with the knowledge and skills required to use engineering information, such as drawings and instructions necessary to carry out vocational engineering operations, with a particular focus on electronics. The ability to access and use information is probably one of the most critical basic vocational skills required in engineering. This unit will enable learners to understand how to make effective use of information when working with documentation that consists of engineering drawings, reference tables, specifications, charts or any other media which carry information, be they printed or digital. Learners will be trained to extract information from engineering drawings and related documents in a fast and reliable way. Learners will also learn how to use drawings and related documentation to determine the work that needs to be done, carry out the work according to specifications, and validate their own performance. Learners will be selecting materials and using measuring and marking out tools and other hand tools to carry out the basic engineering tasks under supervision.
Form 5	**Electronic circuits representation, materials and construction methods**. This unit equips the learner with a skill set of theoretical and practical knowledge relating to the domains of electrical and electronic circuits. By the end of this unit, the learner will be able to read and interpret circuit diagrams while being aware of how different electrical and electronic components interact so that a circuit achieves a desired function. The learner will be able to assemble and test simple circuits on prototype boards, such as a breadboard and a stripboard, and also manufacture a printed circuit board. This skill set is useful if the learner wishes to proceed into a career such as an electronics technician.

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.

The learning outcomes approach allows educators to lean more towards learner-centric teaching and learning strategies. This will mean knowing, among the many ways learners are different from one another, which ones 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.

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 forms, 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 Engineering Technology include:

- I can relate the statutory regulations related to a given engineering activity.
   COGNITIVE LEARNING

  Taken from Unit 1, LO 1, K4.
- I can carry out different tests in order to select engineering material according to a given scenario.
   CREATIVE LEARNING

  Taken from Unit 2, LO 2, A1.

- I can use different tools appropriately to produce a 3D engineering component from given information.
   PRACTICAL

  Taken from Unit 2, LO 4, A3.

Example: Finding opportunities to address CCT learning in Engineering Technology SLOs

- **I can justify the appropriate forms of supply of different materials for given engineering components.**
  COGNITIVE LEARNING

Taken from Unit 2, LO 3, C4.

By focusing on the critical evaluation process of this SLO, opportunities open up for addressing aspects of the Learning to Learn and Cooperative Learning outcomes related to cognitive learning. The particular outcomes that seem to be most relevant are:

- 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 can assess myself to analyse and further develop my ideas.
- 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.

These are CCT outcomes that if learned and developed early in the programme will result in the learner being able to transfer and apply the CCT learning to the Engineering Technology programme. The result should be a better response to the subject SLOs and improved quality of work on Engineering Technology outcomes.

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 Departmental 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

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 FORM

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.

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)

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.

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 syllabus is varied. It is therefore at the discretion of the educator to decide which content needs to be expanded to help learners better understand the subject. It is highly recommended that Engineering Technology educators keep abreast of what is going on in the area to be able to substantiate and enrich their teaching by using factual examples.

Assessment

A. METHODOLOGIES THAT WILL ENSURE FIT FOR PURPOSE ASSESSMENT

Suggested modes of assessment

Educators have the flexibility to design and implement assessment strategies. Educators are able to decide the most appropriate ways to achieve the goal linked to the verb within the learning outcome. It is important to avoid over-assessment and to truly understand the verb in the SLOs before considering any task. It is the educator's responsibility to design assignment briefs which would enable the learners to achieve the assessment criteria. Each assignment brief should have a vocational scenario through which the grading criteria can be assessed. It is of vital importance that the command verbs specified in the grading criteria remain unchanged in the brief. The assessment criteria should be specified against each task.

Bloom's taxonomy was taken into consideration when developing the assessment criteria. When designing briefs the active verb should be highlighted so that learners can understand the type of work that they are required to produce. Some K - **Knowledge** criteria using the verb **'define'** plainly mean define and should not require the learners to provide more than a sentence or two; other verbs such as **describe / explain** may need a more detailed answer. In A - **Application** criteria the verbs **demonstrate / carry out** imply that the tasks assigned are practical and require the learners to put into practice the knowledge, understanding and skills that they have acquired. Application criteria may require essentially carrying out the 'work' related task and thus may be backed up with photo/video graphic evidence. C- **Comprehension** criteria, generally bridge the gap between Ks and As.

A variety of assessment tools/methods can be used to assess learners in VET subjects. The method of assessment can be modified so as to permit learners to achieve the required goals through methods such as:

- visual presentation
- giving a set of instructions to a peer
- discussion
- interview

Schools should provide access arrangements for learners to achieve the assessment criteria of the educational programme.

In the assignment brief one can propose a variety of modes of assessment such as role play, vivas, presentations, written reports, practical assignments, debates, posters and leaflets to cater for different learning styles and abilities.

When the learners are being assessed during practical sessions an observation sheet for each learner should be filled in. This should be prepared together with the assignment brief by the educator. When learners work in a group the individual work should be assessed.

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 to 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 but also be proportionate and manageable. Learners should be involved in the selection of evidence. The evidence should show that the learner has understood a significant body of knowledge, has responded consistently well to challenging learning experiences and has been able to apply what he/she has learned in new and unfamiliar contexts.

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. Once learners are given the chance to interact with their peers and receive constant feedback from their educator, they are ultimately guided to make decisions on how to improve their Engineering Technology knowledge and skills. 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 Engineering Technology. These types of assessments can be planned at particular points, such as the end of a thematic unit, whereby the learners can judge and review their own performance by means of a grid stating the intended learning outcomes vis-à-vis the level in which they have been attained.

Engineering Technology educators will need to have a clear understanding of how their 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 educators reach a shared and consistent interpretation of meaning as they apply the SLOs.

The learner does not have to be secure in every outcome at one level in order to move on to the next. When appropriate, the learner should have the opportunity to engage in learning experiences at the next level. Educators should plan to give learners experience of all the outcomes but should take a holistic view.

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.

The delivery of the learning associated with the CCTs and the associated assessment is the responsibility of all educators.

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, educators 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 educator CPD, monitoring educator 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'.
- creation and use of benchmark metrics to share and compare learner achievement within and across schools.
- 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 addition to the activities listed above, VET educators need to be engaged in:

- regular departmental meetings to plan learning, teaching and assessment in a coherent way and to share effective strategies which they see as enhancing the 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.
- internal verification of assignment briefs prepared by colleagues as to whether they are fit for purpose.
- internal verification of each learner's assignment.
- 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.
- external verification visits in order to make sure that the required standard of work is achieved. These visits will help teachers, assessors, internal verifiers and SMTs to improve their work in relation to the planning, delivery, assessment and management of the VET programme.

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.

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 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 any 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.

Guidance on transitions to the new approach
The practical and take-home tasks should address all criteria.

The current system requires that educators change their assignments often. What is worrying about this is that when educators repeatedly change their assignments, there is an underlying possibility that the whole vocational scenario deviates from the original plan set. This would put the integrity of the whole course at stake. To address this situation it is recommended that the tasks presented should address **all** the criteria in context; this would give the educators the opportunity to simply improve on what was already prepared rather than rewrite the assignment.

1. **The controlled assignment has to change.**
   The current VET 60-40% grading ratio is fair, but is prone to abuse in the controlled assessment grading. The Examination Board has the obligation of informing the public/learner what is going to be assessed in the 40% controlled assignment and this can lead 'astute' learners to play the system. It is therefore recommended that:
   a. the assignment address **all** the grading criteria rather than selected topics: this change will also make resits clearer and fairer; or
   b. the Examination Board retains the right to decide which criteria to assess but is no longer obliged to publish its assessment decisions; or
   c. should the grading criteria for the controlled assessment be chosen by the Examination Board, the grading criteria be distributed to the schools by the end of June (end of the previous scholastic year). This will give educators ample time to prepare the assignments for the remaining grading criteria.

2. **The controlled assessment should be corrected by the Examination Board**
   The design **and** correction of the controlled assessment should be completely in the hands of an independent body to ensure the integrity of the assessment and prevent educators from being pressured by third parties to give higher grades to their learners.

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.

Assessment within the LOFs will need to be subject to robust quality assurance procedures that are designed to instil confidence in educators' 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. As previously mentioned all assignment will be accompanied by a marking scheme so that the assessment is valid, fair and reliable. Furthermore, all assessments will be internally verified before being given out to the learners and after being corrected by the teacher. External verification will also be carried out twice yearly.

It is important that for the vocational course to retain quality standards, assessments presented to the learners should be of the required quality and level, fair for all learners, as well as valid and reliable. To ensure this, validation and verification of every assessment should be primarily carried out by an internal verifier in the subject. It would then be the responsibility of an external verifier (representative of the Examination Board) to ensure conformity throughout the country. At this stage, the work presented by the learner and the marks allotted by the educator in the practical (Assignment 1) and take-home (Assignment 2) assignments, as well as the controlled assessment have to be moderated.

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.

D. ASSESSING CROSS CURRICULAR THEMES

The embedded CCTs within the SLOs are for guidance purposes only. As already indicated, the educator 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 personal 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 any 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 educators 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 level 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:

- Leaners 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.

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 educator will need to have a detailed appreciation of what the learner has already achieved and just how they relate to the learning expectations that educator is responsible for teaching. The educator 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 there is 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.

In VET subjects the assessment is of a formative nature, therefore after each assignment educators communicate the mark to the learners and highlight the areas where they excelled and areas where they could have improved their work. This type of feedback will help the learners to learn from their own mistakes and improve the quality of their work in subsequent assignments. At the end of the scholastic year the total mark that the learners would have achieved in that unit is communicated both to them and to their parents.

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,*
The Scottish Government (2010)

References

European Commission. 2006. *Key Competencies for Lifelong Learning - European Reference Framework*. Luxembourg: Publications Office of the European Union.

European Commission/EACEA/Eurydice. 2012. *Developing Key Competences at School in Europe: Challenges and Opportunities for Policy. Eurydice Report.* Luxembourg: Publications Office of the European Union.

European Commission/EACEA/Eurydice. 2015. *The Teaching Profession in Europe: Practices, Perceptions, and Policies*. Eurydice Report. Luxembourg: Publications Office of the European Union.

European Commission/EACEA/Eurydice. 2015a. *Assuring Quality in Education: Policies and Approaches to School Evaluation in Europe*. Eurydice Report. Luxembourg: Publications Office of the European Union.

Lam, R. 2015. Assessment as learning: examining a cycle of teaching, learning, and assessment of writing in the portfolio-based classroom. *Studies in Higher Education*. [e-journal] 01 (2015) Available through: http://dx.doi.org/10.1080/03075079.2014.999317 [Accessed 12 August 2015].

Ministry for Education and Employment. 2012. *A National Curriculum Framework for All*. [pdf] Malta: Salesian Press. Available at: < http://curriculum.gov.mt/en/resources/the-ncf/pages/default.aspx> [Accessed 20 June 2015].

Ministry for Education and Employment. 2014. *Framework for the Education Strategy for Malta 2014 – 2024*. [Booklet] Available at: <http://education.gov.mt/strategy/Documents/BOOKLET%20ESM%202014-2024%20ENG%2019-02.pdf> [Accessed 23 August 2015].

Ministry for Education and Employment. 2014a. *Respect for All Framework* [pdf] Available at: http://education.gov.mt/en/resources/News/Documents/Respect%20For%20All%20Document.pdf [Accessed 23 August 2015].

Ministry for Education and Employment. 2014b. *A National Literacy Strategy for All in Malta and Gozo 2014 – 2019*. [pdf] Available at: <http://education.gov.mt/en/Documents/Literacy/ENGLISH.pdf> [Accessed 23 August 2015].

Ministry for Education and Employment. 2014c. *A Strategic Plan for Early School Leaving in Malta 2014*. [pdf] Available at: <http://education.gov.mt/ESL/Documents/School%20Leaving%20in%20Malta.pdf> [Accessed 23 August 2015].

Ministry for Education and Employment. 2014d. *Education for All: Special Needs and Inclusive Education in Malta.* [pdf] Available at: <https://education.gov.mt/en/Documents/Special%20Needs%20and%20Inclusive%20Education%20in%20Malta%20%C2%AD-%20External%20Audit%20Report.pdf > [Accessed 23 August 2015].

Ministry for Education and Employment. 2015. *Malta National Lifelong Learning Strategy 2020* [pdf] Available at: <https://education.gov.mt/en/Documents/Malta%20National%20Lifelong%20Learning%20Strategy%202020%20-%20Draft%20for%20Public%20Consultation.pdf> [Accessed 23 August 2015].

Scottish Government. 2010. *Building the Curriculum 5, A Framework for Assessment: Reporting*. [pdf] Edinburgh: Scottish Government. Available at: <https://www.educationscotland.gov.uk/Images/HowgoodisourschoolJtEpart3_tcm4-684258.pdf> [Accessed 30 July 2015].

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 Covenenant 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 perservere.
- 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 forms 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 form.

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 langauge 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 level 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 / l-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

This document is part of the ESF1.228 Project entitled 'Design of Learning Outcomes Framework, associated Learning and Assessment programmes and related Training' implemented under the Operational Programme II – Cohesion Policy 2007-2013 and was part-financed by the European Union European Social Fund co-financing rate: 85% EU Fund; 15% National Funds.

Directorate for Quality and Standards in Education,
Ministry for Education and Employment,
Great Siege Road, Floriana VLT 2000
Malta

Publisher: Directorate for Quality and Standards in Education

www.schoolslearningoutcomes.edu.mt

Operational Programme II - Cohesion Policy 2007-2013
Empowering People for More Jobs and a Better Quality of Life
Project part-financed by the European Union
European Social Fund
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