

Use of the Teaching Materials - Teacher's Manual

Table of Contents

Contents	Page No.
I. Curriculum aims and teaching objectives	2
II. Curriculum concept diagram	4
III. Recommended teaching time allocation	5
IV. Learning elements	7
V. Main contents of the teaching materials	12
VI. Recommended teaching progress	21
VII. Design of teaching materials and guidelines to learning and teaching activities	32
VIII. Assessment methods	35



I. Curriculum aims and teaching objectives

The Curriculum Development Council announced the ‘Technology Education Key Learning Area Curriculum Guide (Primary 1 - Secondary 3)’ in 2002 and mentioned about the curriculum framework. It elaborated that within the knowledge contexts at different learning stages of S1 to S3 students; students can achieve their learning objectives, develop their generic skills and cultivate their own values through three strands, which are:

- Knowledge contexts in technology
- Process in technology
- Impact of technology

The proposed learning elements in the three strands can be divided into common learning elements and knowledge contexts in the six technological areas.

The common learning elements of technology education (TE) include:

- Technology and society
- Safety and health
- Information processing and presentation
- Design and applications
- Consumer education

The six knowledge contexts of technology education are as follows:

- Information and communication technology
- Materials and structures
- Operations and manufacturing

- Strategies and management
- Systems and control
- Technology and living

Key competencies:

TE aims at preparing students to be valuable human capital amidst the rapidly emerging technologies. It enables students to:

- develop technological capability, understanding and awareness
- critically appraise the impacts of technology on the individual, family, society and environment
- become competent and confident members of the world of technology and the society at large

The TE curriculum is designed to match students’ interests and intellectual development at different key stages:

- Key Stages 1 and 2: Awareness and Exploration
- Key Stage 3: Exploration, Experiencing and Familiarisation
- Key Stage 4 and beyond: Exploring Orientation for Life-long Learning and Specialisation

The learning and teaching of TE is:

- purposeful
- progressive and iterative in nature
- involving the coordination of the mind (problem-solving) and hands (hands-on experiences)

This enriched TEKLA curriculum is based on and

responds to the curriculum guidelines, and further enriches the original curriculum framework of Secondary 1 to 3. It recommends the adoption of learning modules, which thoroughly integrates the learning elements within the three knowledge contexts directly related to technological subjects and those common learning elements. The related curriculum is then implemented in the form of core modules and extended modules (modules K and E respectively) within the three knowledge contexts. The learning modules for Secondary 2 are as follows:

KNOWLEDGE CONTEXT 1

MATERIALS AND STRUCTURES

Learning elements of core modules:

(K3) Materials and resources

(K4) Structures and mechanisms

Learning elements of extended modules:

(E2) Material processing

KNOWLEDGE CONTEXT 2

OPERATIONS AND MANUFACTURING

Learning elements of core modules:

(K5) Tools and equipment

(K6) Production process

Learning elements of extended modules:

(E3) Project management

KNOWLEDGE CONTEXT 3

SYSTEMS AND CONTROL

Learning elements of core modules:

(K8) Concepts of System

(K9) Application of Systems

Learning elements of extended modules:

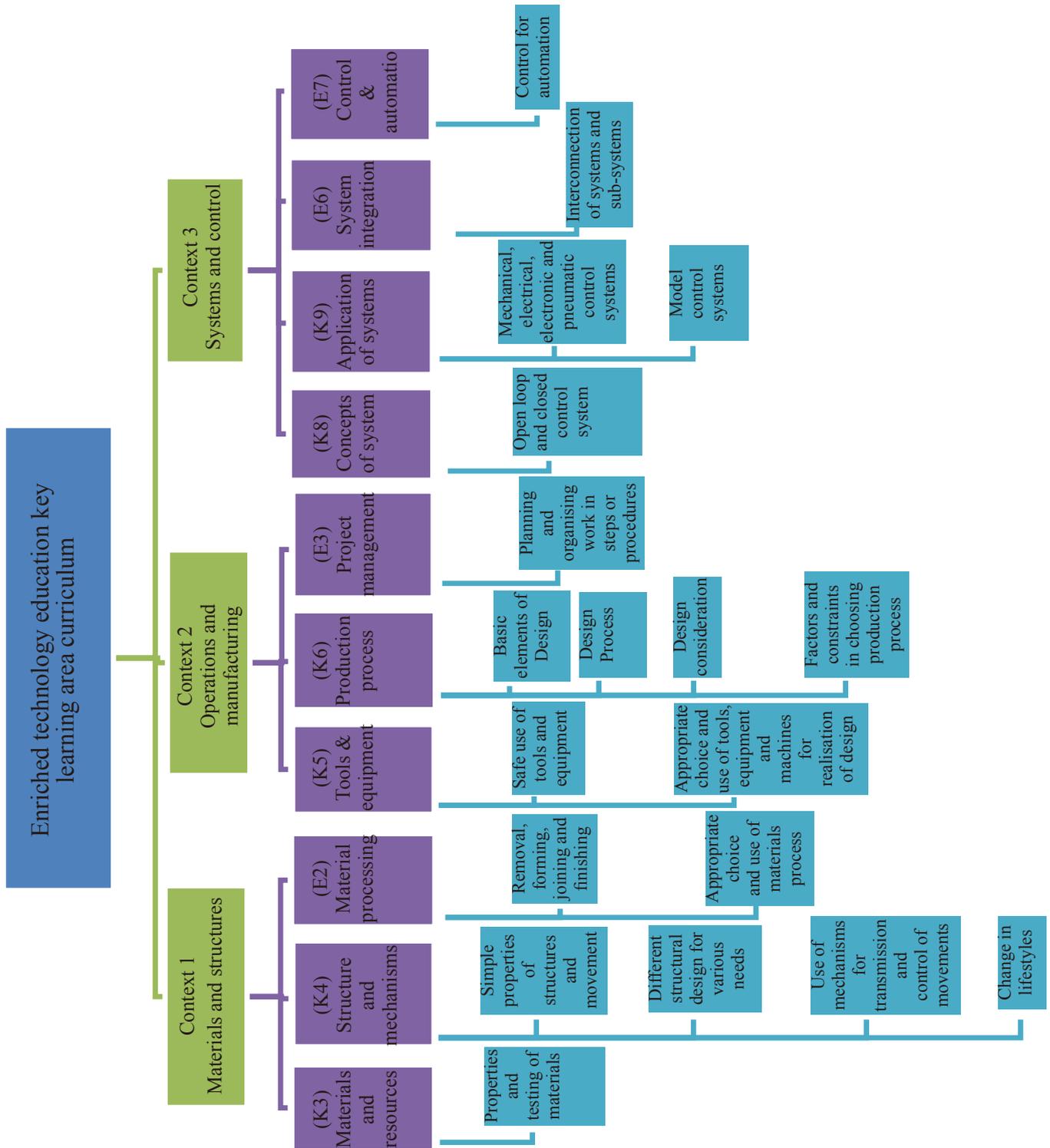
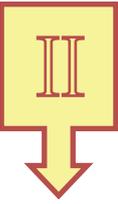
(E6) System integration

(E7) Control and automation

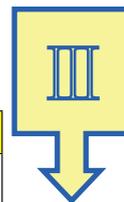
The module contents adopt the progressive manner based on the levels, and iteratively reinforce students' basic knowledge and skills throughout the curriculum of the three years. In addition to providing related knowledge, exercises and activities are also supplemented. Through those project activities, students can coordinate their minds (problem-solving) and hands (hands-on experiences) to achieve excellent learning and teaching results.



II. Curriculum concept diagram



III. Recommended teaching time allocation



Core modules (Combination A)						
Modules	Secondary/ part	Title	Learning elements	Lessons	Teaching Material*	Remarks
K3	S2	Materials and resources	<ul style="list-style-type: none"> Properties and testing of materials 	5	Material 1A	Relevant knowledge 1 lesson Lesson activity 2 lessons Case study 2 lessons
K5	S2	Tools and equipment	<ul style="list-style-type: none"> Safe use of tools and equipment Appropriate choice and use of tools, equipment and machines for realisation of design solution 	7	Material 1B	Relevant knowledge 2 lessons Project activity 5 lessons
K6	S2a	Production process	<ul style="list-style-type: none"> Basic elements of Design Design process Design consideration 	22	Material 2	Relevant knowledge 4 lessons Exercise 3 lessons Project exercise 7 lessons Project activity 8 lessons
(subtotal)				(34)		
Core modules (Combination B)						
Modules	Secondary/ part	Title	Learning elements	Lessons	Teaching Material*	Remarks
K4	S2	Structures and mechanism	<ul style="list-style-type: none"> Simple properties of structures and movement Different structure design for various needs Use of mechanisms for transmission and control of movements Change in lifestyles 	15	Material 3	Relevant knowledge 1 lesson Lesson activity 2 lessons Project activity 12 lessons
K8	S2	Concepts of System	<ul style="list-style-type: none"> Open loop and closed control system 	1	Material 4	Relevant knowledge 2 lessons Exercise 1 lesson Project activity 6 lessons
K9	S2	Application of Systems	<ul style="list-style-type: none"> Mechanical, electrical, electronic and pneumatic control systems Model control systems 	8		
K6	S2b	Production process	<ul style="list-style-type: none"> Design Process Factors and constraints in choosing production process 	8	Material 5	Relevant knowledge 2 lessons Lesson activity 1 lesson Case study 5 lessons
(Subtotal)				(32)		
Grant totals				66		

Teaching material: Including relevant knowledge (notes) and exercises, lesson activities and guidelines for project activities, etc.

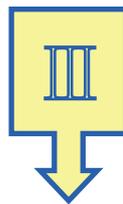
Remarks: The proposals in this teaching plan assume that there are 33 weeks in the academic year, and each lesson lasts for 40 minutes.

If the school arranges an average of 2 lessons

per week, the teacher can choose core modules Combination A plus Combination B

That is: Modules {K3 (5); K4 (15); K5 (7); K6 (22+8); K8 (1); K9 (8)} 66 lessons in total

If the school only arranges 1 lesson per week, the teacher can choose the modules in Combination A or Combination B.



Extended modules (Combination A - Materials and Production)						
Modules	Secondary/ part	Title	Learning elements	Lessons	Teaching Material*	Remarks
E2	S2	Material processing	<ul style="list-style-type: none"> Cutting, forming, jointing and finishing Appropriate choice and use of materials process 	8	Material 1C	Relevant knowledge 2 lessons Exercise 1 lesson Project activity 5 lessons
E3	S2	Project management	<ul style="list-style-type: none"> Planning and organising work in steps or procedures 	6	Material 6	Relevant knowledge 2 lessons Lesson activity 1 lesson Case study 3 lessons
E6	S2	System Integration	<ul style="list-style-type: none"> Interconnection of systems and sub-systems 	18	Material 7	Relevant knowledge 2 lessons Lesson activity 2 lessons Project activity 14 lessons
(Subtotal)				(32)		
Grant totals				98		

Extended modules (Combination B - Structures and Systems)						
Modules	Secondary/ part	Title	Learning elements	Lessons	Teaching Material	Remarks
E7	S2	Control and Automation	<ul style="list-style-type: none"> Control for automation 	32	Material 8	Relevant knowledge 8 lessons Exercise 24 lessons
(Subtotal)				(32)		
Grant totals				98		

The teacher can choose the extended modules in Combination A or Combination B.

IV. The enriched TEKLA curriculum – S2 Learning elements



Knowledge context (1) - Materials and structures

Core modules

Learning elements	Contents
(K3) Materials and resources	<p><u>Properties and testing of materials</u></p> <p>Exploration of properties such as hardness, tensile strength and conductivity of common materials (i.e. wood, metal, plastic & fabric)</p> <p>Application of materials tests results to suggest appropriate uses for materials °</p>
(K4) Structures and Mechanisms	<p><u>Simple properties of structures and movement</u></p> <ul style="list-style-type: none"> • Classification of motions, such as linear, rotary, oscillatory and reciprocatory <p><u>Different structure design for various needs</u></p> <ul style="list-style-type: none"> • Awareness of different structures and mechanisms can enhance the functionality of various designs to suit different needs • Application of appropriate structures in design with considering the state of equilibrium and weak points <p><u>Use of mechanisms for transmission and control of movements</u></p> <ul style="list-style-type: none"> • Application of common mechanical components to convert and control motion, such as drive systems and rotating shafts, belts and pullets <p><u>Change in lifestyles</u></p> <ul style="list-style-type: none"> • Identification of daily activities that involve the use of technology, e.g. communication and transportation • Application of tools, equipment, resources and human intelligence to make changes in the natural worlds in fulfilling needs. • Understanding that most developments of technology are market and profit driven which are needs to be scrutinised when necessary. • Understanding that technological decisions are affected by economic, political and cultural considerations and in return, economic, political and cultural issues are influenced by development and use of technology. • Examples on innovative technological devices that have improved the quality of life for individuals. Choose an example of such an invention that informed the bases for a major change in the way we live our lives. • Prediction on how innovative technology will change in the future and will have an impact on individuals, careers, family & society.

Extended modules

(E2) Material processing	<p><u>Processing of materials – removal, forming, joining and finishing</u></p> <ul style="list-style-type: none">• Understanding of materials processing methods to implement design solutions, including: Removal: cutting with hand tools, machining with lathe turning, drilling and sawing. <p><u>Appropriate choice and use of materials process</u></p> <ul style="list-style-type: none">• Selection of appropriate materials and processing methods according to requirements, such as material properties, safety and quantity.
--------------------------	---

Knowledge context (2) – Operations and manufacturing**Core modules:**

Learning elements	Contents
(K5) Tools and equipment	<p><u>Safe use of tools and equipment</u></p> <ul style="list-style-type: none"> Explanation and demonstration on how bench type machines are used to process materials, e.g. jig saw and drilling machine. <p><u>Appropriate choice and use of tools, equipment and machines for realisation of design solution</u></p> <ul style="list-style-type: none"> Appropriate ways to select, operate, maintain & dispose of technological devices.
(K6) Production Process	<p><u>Basic elements of design</u></p> <ul style="list-style-type: none"> Presentation of design ideas in 2D and 3D using free-hand sketching and projection views (e.g. sketching, perspective and isometric drawing, 3D modelling) Design movements (e.g. Arts and Craft, Art Nouveau, Art Deco, De Stijl, Bauhaus, Modernism, Pop Art, Cubism, Memphis, Post-modernism.) <p><u>Design process</u></p> <ul style="list-style-type: none"> Identification of a simple current technological problem. Application of various design methods in problem solving (e.g. Factor analysis, lateral thinking, mind map, brain-storming.) Communicating a problem, design or solution using drawings and words. Investigation on different areas & propose solutions to the problem Designing and building models by using different materials and test the selected functional characteristics of the models built. Implementation of a solution by constructing a device using materials provided. Evaluation of solution on whether it meets the goals. Suggestion of improvement to the solution. Recognition of the concepts used in the design cycle and apply them in solving problems. <p><u>Design consideration</u></p> <ul style="list-style-type: none"> Ethical issues related to design, production and sales of product. <p><u>Factors and constraints in choosing production process</u></p> <ul style="list-style-type: none"> Selection of the appropriate hand tools, machines and equipment for use with a variety of materials and a range of technological components in a safe and correct manner. Basic concepts of product-design for manufactured products or systems. Functions and application of simple manufactured products or systems in domestic, leisure, business and industrial contexts. (e.g. hair dryers, vacuum cleaners and electric irons) Materials and processes used to produce such products or systems. Basic scientific principles and technologies involved in such products or systems. Disposal of product or system.

Extended modules:

(E3)Project Management	<p><u>Planning and organising work in steps or procedures</u></p> <ul style="list-style-type: none">• Setting of overall project goals, such as set about tasks, sequencing activities, develop schedules• prioritising actions in evaluation of design proposals such as selecting suitable production process, testing of materials, making and testing of prototypes, evaluating product performance, investigating and reconciling conflicting requirements, assessing the quality and organise the ways forward.• Development of cost estimates and budgets to plan project expenditures.• Analysis of resources allocation and labour utilisation for cost effectiveness.
------------------------	--





Knowledge context (3) – Systems and control

Core modules:

Learning elements	Contents
(K8) Concepts of system	<p><u>Open loop and closed loop control system</u></p> <ul style="list-style-type: none"> Understanding the concept of two types of control systems: open loop system and closed loop system.
(K9) Application of systems	<p><u>Mechanical, electrical, electronic and pneumatic control systems</u></p> <ul style="list-style-type: none"> Functions of basic electronic and electrical components, devices and simple theories. <p><u>Model control systems</u></p> <ul style="list-style-type: none"> Safety measures and precautions in associated with construction of the electronic, pneumatic and computer control systems.

Extended modules:

(E6) System integration	<p><u>Interconnection of systems and sub-systems</u></p> <ul style="list-style-type: none"> Appropriate application of equipment and instruments <ul style="list-style-type: none"> -Operation of basic electronic and electrical equipment and measuring instruments. -Common tools and machines in doing electronic and electrical projects. Application of different types of systems (mechanical, electronic, pneumatic, and computing) and sub-systems that can be interconnected to achieve a particular function. Analysis of simple system-designs by using block diagrams. Simple systems design in order to meet specified problems. Combination of interrelated systems (software applications, structures and/or mechanisms) in order to create a new system which could be connected with other systems.
(E7) Control and automation	<p><u>Control for automation</u></p> <ul style="list-style-type: none"> Fundamental principles and basic physical architecture of the PC based computer system to exercise control. Advantages and limitations of a computer-control system. Application of simple devices for input and output. Design of simple control program using a flowchart. Use of control software and interface to exercise control. Application of construction kits to model computer-control systems to achieve specified functions.

V. Main contents of the teaching materials



Material 1A: Properties and testing of materials

Relevant knowledge	Lesson activity / exercise	Case study
I Properties and testing of materials <ol style="list-style-type: none"> 1. Physical properties 2. Mechanical properties <ol style="list-style-type: none"> (a) Tensile strength (b) Compression strength (c) Ductility and malleability (d) Toughness (e) Hardness (f) Stiffness II Testing of materials <ol style="list-style-type: none"> 1. Testing of electrical conductivity 2. Testing of hardness Testing of tensile strength 	Lesson activity – Testing of materials Exercise	Properties of materials – Electric plugs

Material 1B: Tools and equipment

Relevant knowledge	Lesson activity / exercise	Project activity
I Safe use of tools and equipment <ol style="list-style-type: none"> 1. Drilling machines 2. Jigsaws II. Selection, operation, maintenance and disposal of technological equipment <ol style="list-style-type: none"> 1. Choosing a cutting method <ol style="list-style-type: none"> (a) Constraints of resources (b) Sizes and shapes of workpieces (c) Materials of workpieces (d) Surface quality and precision (e) Quantity of production 2. Maintenance of tools and equipment 3. Disposal of tools and equipment 	Exercise	Tools and equipment – Nameplate with personal style

Material 1C: Material processing



Relevant knowledge	Lesson activity / exercise	Project activity
<p>I Material processing technology</p> <ol style="list-style-type: none"> 1. Material removal <ol style="list-style-type: none"> (a) Hand cutting (b) Machine cutting <ol style="list-style-type: none"> (i) Drilling machines (ii) Metalwork lathes (iii) Woodwork lathes (iv) Sawing machines 2. Jigsaw <p>II. Selection of appropriate materials and processes</p> <ol style="list-style-type: none"> 1. Properties of materials 2. Safety <p>Quantity of production</p>	<p>Exercise</p>	<p>Material processing – Smart assembled device</p> <p>Reference: Examples of three-dimensional assembled device</p>

Material 2: Design Elements and Drawing



Relevant knowledge	Lesson activity / exercise	Project activity
<p>Basic elements of design</p> <p>1. Design movements</p> <ul style="list-style-type: none"> (a) Arts and craft movement (b) Art Nouveau (c) Art Decoratifs / Art Deco (d) De Stijl (e) Bauhaus (f) Modernism (g) Pop Art (h) Cubism (i) Post-modernism <p>2. Freehand sketch and projection views</p> <ul style="list-style-type: none"> (a) Perspective drawing (b) Orthographic drawing <ul style="list-style-type: none"> (i) First angle projection (ii) Third angle projection (iii) Isometric drawing <p>Enhancing the 3D visual effects of design products</p>	<p>Exercise</p> <p>Project exercise – Projection views</p>	<p>Design process and consideration - Commemorative stationery organiser</p>

Material 3: Structures and mechanisms

Relevant knowledge	Lesson activity / exercise	Project activity
<p>I Simple properties of structure and movements Classification of motion</p> <ol style="list-style-type: none"> 1. Linear motion 2. Rotary motion 3. Oscillating motion 4. Reciprocating motion <p>II Different structural design for various needs</p> <ol style="list-style-type: none"> 1. Different structures can enhance functionality to suit different needs <ol style="list-style-type: none"> (a) Naturally-occurring structures (b) Man-made structures 2. Different mechanisms can enhance functionality to suit different needs 3. Application of appropriate designs with considerations of the state of equilibrium and weak points of structures <ol style="list-style-type: none"> (a) Equilibrium and stability (b) Weak points <p>III Use of mechanisms for transmission and control of movements</p> <p>IV Change in lifestyles</p> <ol style="list-style-type: none"> 1. Impacts of technology on our living 2. The advent and development of telephones 3. Influence of market on technology 	<p>Lesson activity - Structure design and change in lifestyles</p>	<p>Structures and movement - Structure model of dynamics</p> <p>References: Various moving toy models and simulation software</p>

Material 4: Concepts of and Application of Systems

Relevant knowledge	Lesson activity / exercise	Project activity
<p>I Concepts of system Open loop and closed loop control system</p> <ul style="list-style-type: none"> (a) Open loop control system (b) Closed loop control system <p>II Application of systems Interconnection of systems and sub-systems</p> <ul style="list-style-type: none"> 1 Basic electricity <ul style="list-style-type: none"> (a) Voltage, current and resistance (b) Ohm's Law and its applications (c) relationship between voltage, current and resistance (d) Connected in series and in parallel (e) Series circuit and parallel circuit (f) Calculation of series and parallel circuits (g) Voltage division 2 Conversion of electrical energy 3 Basic electrical components 4 Use of electricity 5 Safe use of electrical appliances 	Lesson activity	<p>Electric circuits– Soft soldering of wires</p> <p>References: Soldering</p>

Material 5: Design Process and Consideration

Relevant knowledge	Lesson activity / exercise	Case study
<p>I Design process</p> <p>(a) Analysis of design factors</p> <p>(i) Design matrix</p> <p>(ii) Checklist technique - SCAMPER</p> <p>(b) Vertical thinking and lateral thinking</p> <p>(i) Vertical thinking</p> <p>(ii) Lateral thinking</p> <ul style="list-style-type: none"> • Brainstorming • Mind map <p>II Design consideration</p> <p>Ethical issues related to the design, production and sales of products</p> <p>III Considerations in choosing appropriate production processes</p> <ol style="list-style-type: none"> 1. Selection of appropriate hand tools, machines and equipment for use with a variety of materials and a range of technological components in a safe and correct manner 2. Basic concepts of product design for manufactured products or systems 	<p>Lesson Activity – Group discussion on design consideration</p>	<p>Design process - Innovative hair dryer</p>

Material 6: Planning and Organisation

Relevant knowledge	Lesson activity / exercise	Case study
<p>Project Management</p> <ol style="list-style-type: none"> 1. Procedures for developing new projects 2. Setting overall objectives of the project <ol style="list-style-type: none"> i. Planning execution ii. Executing processes 3. Arrangement of work <ol style="list-style-type: none"> i. Teamwork ii. Reviewing iii. Cost-effectiveness evaluation <p>Case study of new product development</p> <ol style="list-style-type: none"> 1. Design processes of a hearing device 2. Production cost of a potato peeler 	Lesson activity	The success of an innovation – Smartphones



Material 7: System Integration

Relevant knowledge	Lesson activity / exercise	Project activity
<p>Interconnection of systems and sub-systems</p> <p>I Development of electronics technology</p> <p>1. Development of electronics technology</p> <p>a. Vacuum tubes</p> <p>b. Transistors</p> <p>c. Integrated circuits</p> <p>2. Semiconductor and transistor</p> <p>a. Functions of transistors</p> <p>b. Applications of transistors</p> <p>II Common electronic components</p> <p>1. Common input components</p> <p>2. Common processing components</p> <p>3. Common output components</p> <p>III Electronic-control circuits</p> <p>1.Design example</p> <p>2.Circuit design</p> <p>IV Circuit diagram and printed circuit board</p> <p>1. Circuit diagram</p> <p>2. Simulation testing</p> <p>3. Breadboard testing</p> <p>4. Printed circuit board testing</p>	<p>Lesson activity</p> <p>- Circuit design</p> <p>Exercise</p>	<p>Electronic-control–</p> <p>Environment model</p>

VI. Recommended teaching progress



Material 1A

Learning Units	Elements
(K3) Materials and resources	Relevant knowledge - Properties of materials Testing of materials Case study – Properties of materials - electric plugs

1. Objectives

Students acquire a basic understanding about the properties of materials, and apply appropriate methods in basic testing of materials.

2. On completion of the project activity, students should be able to master:

- Physical properties of materials
- Mechanical properties of materials
- Testing of electrical conductivity, hardness and tensile strength on materials

3. Recommended time

2 1/2 weeks × 2 lessons = 5 lessons (200 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	1. Physical properties 2. Mechanical properties	Testing of materials	Observe the objects around. Understand that the materials used for producing the objects are of different properties.
2	Testing of materials	1. Testing of materials 2. Case study – Properties of materials - electric plugs	Understand and perform simple testing of materials
3		Case study – Properties of materials - electric plugs	1. Carry out analysis regarding a specific aspect of a product 2. Present analysis results with the use of communication skills



Material 1B

Learning Units	Elements
(K5) Tools and equipment	Relevant knowledge – Safe use of tools and equipment Selection, operation, maintenance and disposal of technological equipment Project activity - Tools and equipment –Nameplate with personal style

1. Objectives

Students acquire a basic understanding about tools and equipment, the correct way to use appropriate tools and equipment for production, and the maintenance and disposal.

2. On completion of the project activity, students should be able to master:

- Safe use of tools and equipment
- Selection, operation, maintenance and disposal of technological equipment

3. Recommended time

3 1/2 weeks × 2 lessons = 7 lessons (280 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	Safe use of tools and equipment	1. Exercise 1 2. Consideration factors for the design of the nameplate with personal style	1. Complete the exercise and meet the basic requirements 2. Indicate reasonably the consideration factors for design
2	Selection, operation, maintenance and disposal of technological equipment	1. Exercise 2,3,4 2. Freehand sketch of the design of the nameplate with personal style 3. Determine the tools and equipment to be used	1. Freehand sketch of the design of the nameplate with personal style and meet the basic requirements 2. Determine reasonably the tools and equipment to be used
3	Demonstrate how to use tools and equipment correctly	Produce the nameplate with personal style	Use tools to make the nameplate with personal style safely
4		1. Decorate the nameplate with personal style 2. Complete the design folio	1. Complete the production of the nameplate with personal style 2. Complete the design folio according to guidelines



Material 1C

Learning Units	Elements
(E2) Material processing	Relevant knowledge – Material processing technology Selection of appropriate materials and processes Project activity - Material processing – Smart assembled device

1. Objectives

Students acquire a basic understanding about the hand cutting and machine cutting, and select appropriate materials and processing method for various needs.

2. On completion of the project activity, students should be able to master:

- Material processing technology
- Selection of appropriate materials and processes

3. Recommended time

4 weeks × 2 lessons = 8 lessons (320 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	Material processing technology	1. Exercise 1 2. Freehand sketch of the basic design diagram of the smart assembled device	1. Complete the exercise and meet the basic requirements 2. Freehand sketch of the design of the smart assembled device and meet the basic requirements
2	Material processing technology	1. Exercise 2 2. Determine the tools and equipment to be used	1. Complete the exercise and meet the basic requirements 2. Determine reasonably the tools and equipment to be used
3	Selection of appropriate materials and processes	Produce the smart assembled device	Use the tools safely to produce the smart assembled device
4		1. Decorate the smart assembled device 2. Complete the design folio	1. Use the tools safely to produce the smart assembled device 2. Complete the design folio according to guidelines

Material 2



Learning Units	Elements
(K6) Production process	Relevant knowledge - Basic elements of design Project activity - Design process and consideration - Commemorative stationery organiser

1. Objectives

Students acquire a basic understanding about design movements, and apply them in design products; and use freehand sketch and projection views to express design ideas.

2. On completion of the project activity, students should be able to master:

- Development of design movements
- Freehand sketch and projection views

3. Recommended time

11 weeks × 2 lessons = 22 lessons (880 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	1. Design movements, P.1-2 2. Freehand sketch and projection views, P.6-9	1. Exercise 1,2 2. Exercise in projection views 2-3 pages	Complete the exercise in projection and meet the basic requirements
2	1. Design movements, P.3-4 2. Freehand sketch and projection views, P.10-13	1. Exercise 3,4 2. Exercise in projection views 4-5 pages	Complete the exercise in projection and meet the basic requirements
3	1. Design movements, P.5 2. Freehand sketch and projection views, P.14-17	1. Exercise 5 2. Information collection of the commemorative stationery organiser 3. Design consideration in the commemorative stationery organiser	1. Complete the exercise in projection, and meet the basic requirements 2. Collect information and make consideration, and meet the basic requirements
4	Freehand sketch and projection views, P.18-23	1. Exercise in projection views 6-7 pages 2. Freehand sketch of the design of the commemorative stationery organiser	1. Complete the exercise in projection and meet the basic requirements 2. Sketch the design of the organiser meet the basic requirements
5		1. Exercise in projection views 11-12 pages 2. Produce the commemorative stationery organiser	1. Complete the exercise in projection and meet the basic requirements 2. Safe use of tools to make the commemorative stationery organiser
6		1. Produce and decorate the commemorative stationery organiser 2. Prepare the design folio	1. Safe use of tools to complete the commemorative stationery organiser 2. Complete the design folio according to guidelines



Material 3

Learning Units	Elements
(K4) Structures and mechanisms	Relevant knowledge – Simple properties of structures and movement Use of mechanisms for transmission and control of movements Change in lifestyles Project activity - Structures and movement - Structure model of dynamics

1. Objectives

Students acquire a basic understanding about structures and mechanisms, and design the structures for various needs, and apply in transmission and control of movements

2. On completion of the project activity, students should be able to master:

- Classification of motion
- Different structures
- State of equilibrium and weak points of structures
- Use of mechanisms for transmission and control of movements
- Change in lifestyles

3. Recommended time

7.5 weeks × 2 lessons = 15 lessons (600 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	1. Classification of motion 2. Different structures	Exercise 1	Complete the exercise and meet the basic requirements
2	State of equilibrium and weak points of structures	1. Collect information for the structure model of dynamics 2. Design consideration in the structure model of dynamics	Collect information and make consideration, and meet the basic requirements
3	Use of mechanisms for transmission and control of movements	1. Exercise 2 2. Freehand sketch of the initial design of the structure model of dynamics	1. Complete the exercise and meet the basic requirements 2. Draw the initial design and meet the basic requirements
4	Change in lifestyles	1. Exercise 3 2. Draw the design of the structure model of dynamics by orthographic drawing	1. Complete the exercise and meet the basic requirements 2. Complete the drawing of the design and meet the basic requirements
5	Methods of making models	Make the structure model of dynamics	Progress of making
6	Skills of making models	1. Make the structure model of dynamics 2. Prepare the design folio	Progress of making
7	Methods and skills of decorating models	1. Make and decorate the structure model of dynamics 2. Prepare the design folio	1. Progress of making 2. Prepare the design folio according to guidelines
8		1. Complete the structure model of dynamics 2. Complete the design folio	1. Safe Use of tools to make the structure model of dynamics 2. Complete the design folio according to guidelines



Material 4

Learning Units	Elements
(K8) Concepts of system (K9) Application of systems	Relevant knowledge – Concepts of system Application of systems Project activity –Electric circuits - Soft soldering of wires

1. Objectives

Students acquire a basic understanding about the open loop and closed loop control system, electrical systems and safe use of them.

2. On completion of the project activity, students should be able to master:

- Open loop and closed loop control system
- Basic electricity
- Conversion of electrical energy
- Safe use of electrical appliances

3. Recommended time

4.5 weeks × 2 lessons = 9 lessons (360 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	Open loop and closed loop control system	Exercise	Complete the exercise and meet the basic requirements
2	1. Basic electricity 2. Conversion of electrical energy	1. Exercise 2. Design project of soft soldering of wires	1. Complete the exercise and meet the basic requirements 2. Complete the design project of soft soldering of wires
3	1. Safe use of electrical appliances 2. Soft soldering	1. Trial of soft soldering of wires 2. Electric circuits – Production of soft soldering of wires	Progress of making
4		Produce the soft ‘soldering of wires’	Progress of making
5		Produce and improve the ‘soft soldering of wires’	Complete the production

Material 5



Learning Units	Elements
(K6) Production process	Relevant knowledge – Design process Design consideration Considerations in choosing appropriate production processes Case study - Design process - Innovative hair dryer

1. Objectives

Students acquire a basic understanding about various thinking methods of design, and consider appropriate production process for design.

2. On completion of the project activity, students should be able to master:

- Analysis of design factors
- Vertical thinking and lateral thinking
- Ethical issues related to the design, production and sales of products
- Considerations in choosing appropriate production processes

3. Recommended time

4 weeks × 2 lessons = 8 lessons (320 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	1. Analysis of design factors 2. Vertical thinking and lateral thinking	1. Discussion on analysis of design factors 2. Group activity in lateral thinking (topic assigned by teachers or hair dryer)	Complete the lesson activity and meet the basic requirements
2	1. Ethical issues related to the design, production and sales of products 2. Considerations in choosing appropriate production processes	Exercise involving ethical issues related to the design, production and sales of products	Complete the exercise and meet the basic requirements
3	Analysis method of the study	Study on innovative hair dryer	Progress of the study report
4		Study on innovative hair dryer	Complete the study report

Material 6



Learning Units	Elements
(E3) Project management	Relevant knowledge - Planning and organising work in steps or procedures Case study–The success of an Innovation – Smartphones

1. Objectives

Students acquire a basic understanding about the development and project management of new products, and review and make assessments on the new products.

2. On completion of the project activity, students should be able to master:

- Procedures for developing new projects
- Setting overall objectives of the project
- Arrangement of work

3. Recommended time

3 weeks × 2 lessons = 6 lessons (240 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	Procedure for developing new projects	The development procedures for 'The success of an innovation – Smartphones'	Complete the activity and meet the basic requirements
2	1. Setting overall objectives of the project 2. Arrangement of work	The study of 'The success of an innovation – Smartphones'	Progress of the study report
3		The study of 'The success of an innovation – Smartphones'	Complete the study report



Material 7

Learning Units	Elements
(E6) System integration	Relevant knowledge – Interconnection of systems and sub-systems Project activity – Electronic-control–Environment model

1. Objectives

Students acquire a basic understanding about the interconnection of systems and sub-systems, and the electronics technology.

2. On completion of the project activity, students should be able to master:

- Development of electronics technology
- Common electronic components
- Electronic-control circuits
- Arrangement for the work of circuit diagram and printed circuit board

3. Recommended time

9 weeks × 2 lessons = 18 lessons (720 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	1. Development of electronics technology 2. Common electronic components	Lesson activity for understanding electronic components	Complete the exercise and meet the basic requirements
2	Electronic-control circuits	Lesson activity for understanding circuits	Complete the exercise and meet the basic requirements
3	Arrangement for the work of circuit diagram and printed circuit board	Consideration factors– Electronic-control–Environment model	Complete the consideration and meet the basic requirements
4		1. Information collection of the environment model 2. Design consideration of the environment model	Complete the information collection and meet the basic requirements
5	Use of simulation software	1. Use of simulation software 2. Freehand sketch of the initial design of the environment model	Sketch the environment model and meet the basic requirements
6	Method of producing the model	1. Improve the design of the environment model 2. Draw the projection views of the environment model 3. Produce the environment model	1. Draw the design of the environment model and state the design idea, and meet the basic requirements 2. Draw the projection views of the environment model and meet the basic requirements
7	Method of decorating the model	Produce the environment model	Make the progress of the production of the environment model
8		1. Produce and decorate the environment model 2. Prepare the design folio	Make the progress of the environment model and the design folio
9		1. Complete the production and decoration of the environment model 2. Complete the design folio	Complete the environment model and the design folio, and meet the basic requirements

Material 8

Learning Units	Elements
(E7) Control and automation	Relevant knowledge - Control for automation Exercise – Drawing electronic circuit diagrams computer animation of pneumatic control systems

1. Objectives

1. Students acquire a basic understanding about using electronics, microprocessors and computers to control automation.
2. Using construction kits to model pneumatic-control systems to achieve specified functions so as to have a basic understanding about pneumatic-control systems

2. On completion of the project activity, students should be able to master:

1. Understand the basic categorisation of integrated circuits;
2. Acquire a basic understanding about IC 555 and IC 741, and apply in design exercise;
3. Understand the use of electronics, microprocessors and computers in automation;
4. Recognise the common symbols for representing electronics components and drawing simple electronic circuit diagrams
5. Using construction kits to model pneumatic-control systems to achieve specified functions including flow amplification, signal inversion, memory function, delay function, control of single acting cylinder, control of double acting cylinder

3. Recommended time

16 weeks × 2 lessons = 32 lessons (640 minutes)

4. Content of activities

Weeks	Teaching Activities	Learning Activities	Assessments
1	Understand the basic categorisation of integrated circuits (IC)	Discussion and collection of the uses of ics	Complete a brief report from the discussion
2	555 timer IC	Exercise	Complete the exercise and meet the basic requirements
3	IC 741 operational amplifier	What are the uses of different ICs?	Complete the exercise and meet the basic requirements
4	Understand the use of electronics, microprocessors and computers in automation	Lesson discussion	Complete a brief report from the discussion
5	Recognising the common symbols for representing electronics components	Exercise 1,2 Draw simple electronic circuit diagrams	Complete the exercise and meet the basic requirements
6	Introduction to pneumatic system	Understand the software of the animation of pneumatic control systems	
7	Various parts and safety of a pneumatic system	Understand various parts of a pneumatic system	
8	1. Pneumatic components 2. Pneumatic circuit	Recognise pneumatic components and pneumatic flow from pneumatic circuit diagrams	Recognise pneumatic components and meet the basic requirements
9	1. Planning a pneumatic circuit diagram setting 2. Safety precautions when using pneumatic control systems	Recognise the directions of gas flow in a pneumatic device from pneumatic circuit diagrams	Recognise the directions of gas flow in a pneumatic device and meet the basic requirements
10	1. Use of software for the simulation of pneumatic systems 2. Connect pneumatic components according to pneumatic circuit	1. Use software for the simulation of pneumatic systems 2. Connect pneumatic components according to pneumatic circuit	Use software for the simulation of pneumatic systems and select basic pneumatic components
11	Flow amplification, signal inversion	Group activity:	1. Use software for the simulation of pneumatic systems and draw basic pneumatic circuit diagrams, and meet the basic requirements
12	1. Memory function 2. Pneumatic delay circuit	1. Use software for the simulation of pneumatic systems 2. Connect pneumatic components according to Pneumatic circuit	2. Connect pneumatic components according to pneumatic circuit and meet the basic requirements
13	Control of single acting cylinder		
14	Control of double acting cylinder		
15	Speed control		
16	Examples of application of pneumatic systems		



VII. Design of teaching materials and guidelines for learning and teaching activities



(a) Design of teaching material

Traditional teaching emphasis on lecturing by the teachers, students are to listen, then imitate and exercise repetitively. This learning model is relatively boring and lacking creativity. In order to enhance students' motivation to learn and induce their active learning, they must first realise about the need to learn. This method of learning has to cope with different learning and teaching activities in order to achieve the desired results

To experience the main strands in technology education, including technology knowledge, technology process and the impact of technology, technology education always encourages the approach of learning through problem solving, design and realisation, from which students realise the needs for learning and application of technology. They also will understand the purpose of learning, which will increase their motivation and interest to learn.

The activities designed in our teaching materials also adopt this learning model. To cope with the characteristics of the teaching contents, the structure of the teaching and learning materials is grouped into “Relevant knowledge”, “Lesson activity”, “Case study”, “Project activity / Design project”, etc.

(i) “Relevant knowledge”

The selected contents of each set of teaching material cover in whole or in part of those learning elements in the knowledge contexts of the learning modules. The rich descriptions and illustrations elaborate those related knowledge according to different levels and serve as references for students and teachers. "Glossary of terms" and "Interactive information" were added as references and extended reading material. Teachers need to select the appropriate part, while adding some interesting or latest materials to enrich the teaching contents.

(ii) “Lesson activity”

Each set of material provides learning and teaching

activities or exercises for teachers to choose. Exercises are commonly used to strengthen students' technology knowledge and skills, such as sketching exercises. The learning and teaching activities may suggest teachers to organise group discussions, guide students to collect data and conduct problem synthesis and analysis.

(iii) “Case study”

Through practical case studies, students will understand how technological principles can be applied in different products and environment. With technology knowledge and skills, it helps further develop students' critical thinking, problem solving and conducting study capabilities. Through exploration approach of learning, students will have a better understanding of the impact of technology to the society.

(iv) “Project activity”

The main objective of "Project activity" is to develop students' technological capabilities through problem solving and realisation. Activities are generally in the form of learning through problem-solving situation and design at working, which is to accomplish the purpose of solving problems for a fixed problem subject to pre-determined constraints. Students are to consider the situation of problem and conditions of constraints and then set the design needs. Various solutions are then designed after taking into account the different affecting factors. The final design is selected after catering for the strengths and weaknesses of different solutions, and then put into practices to complete the solutions according to plan. Finally the effectiveness of the solutions is evaluated to see whether they can solve the needs of the original problems.

As the "Design project" requires the making of artefacts or models, so more time is needed and it usually takes six to eight teaching weeks to complete. Through the design exercises, students have to make



the artefact or model of the product and put into practice their design ideas, thus they can experience the technological process in a more comprehensive manner.

"Project activity" can also be conducted in a variety of forms including the mode of experiment, such that students can appreciate those technological principles from the experiments. Students take into consideration requirements of the situation and equipment limitations, then design solutions and use technological devices (such as electronic modules, pneumatic components, microcomputer controller, etc.) to conduct experiments and tests. Students can also experience how to apply technological principles in their daily lives, for example pneumatic principle is a more difficult technological knowledge to comprehend, but through "Project activity", students understand how to make use of pneumatic principles to operate the opening and closing of MTR train and bus doors.

Since the production and testing time is shorter, some of the "Project activity" may need less teaching time, and can be completed in only one to three weeks of teaching. Students do not need to make a complete design model, they may simply write up a project report.

(b) Teaching activity

After selecting the teaching materials, teachers can flexibly use different teaching modes to conduct activities. Similarly, "Project activity" and "Design Project" also have different methods to conduct activities at the right time in order to increase the interest of learning. For example, teachers may use individual or group, oral report or submission of project report, making models or artefacts, etc. in their lessons. While selecting the methods, things to be considered include the nature of the activities, the time required, limitations in making and provision of the school equipment. Different teaching models are provided as follows for reference:

(i) Individual project

Some exercises emphasise on the design aspect, so if the school has sufficient resources, individual assignments should be adopted. Such kind of

exercises enables students to realise their creativities, train their skills in operating machinery and preparing project reports.

(ii) Group project

Some teaching packages are insufficient to have a separate copy for each student and require them to do the research together to find out the answers. These packages focus on some conceptual theories and group activities will be more appropriate.

Some complicated exercises can be conducted in groups also. For example, in designing an intelligent work table, due to the large amount of data to be collected and the task needs a large number of people, such exercises are suitable to be conducted in groups.

In designing an ideal office, as there are a lot of office equipment so each group can be responsible for some different parts. After all groups have completed, the combination will become a large-scale finished product.

(iii) Demonstration and explanation

Teachers can explain and elaborate the contents of those related knowledge through demonstrations and explanation to the students. This allows students to understand manipulation of hand tools and machinery, working procedures and safety measures.

(iv) Group discussion

Students share and exchange their personal views and findings with each other, so as to develop collaborative skills, communication skills, critical thinking skills and self-management capabilities.

(v) Explorative learning

Through experiments, students can test their hypothesis, designs and solutions, etc., so as to develop their creativity, numeracy skills, problem solving skills and the ability to conduct study.

(vi) Computer simulation software

Through computer simulation software, students can design the arrangements of electric circuit or pneumatic circuit devices. Some of these designs can even be simulated for testing so that improvements can be made.



(vii) Visits and interviews

Students can conduct visits or interviews to gain experience or knowledge outside the classroom, so as to develop their communication skills and the abilities to carry out study, critical thinking, etc.

(viii) Collaboration with the industry or professional bodies

Teachers can recommend or arrange students to collaborate with companies or professional organisations in related industries to establish learning models, such as work experience programme. Experts are invited as design or technical consultants, whereas the organisations can provide some actual design requirements for students to carry out problem-solving and design. This mode of learning will greatly increase students' interest towards learning.

(viii) Mobility use of learning modules

As teaching equipment are limited, certain equipment are insufficient for the whole class to carry out project activities or design exercises at the same time, such as electronic modules, pneumatic modules, etc. When conducting such activities, mobility use of learning modules will be adopted, that is simultaneously

performing multiple activities in the lessons for better usage of resources.

This approach encourages the independent learning spirit of students through practices. Teachers need to prepare worksheets for students to enable them to complete the required practices according to the instructions and steps in the worksheets. Teachers should also allocate appropriate amount of time to provide students some guidance and for answering questions.

Mobility use of learning module makes learning more flexible. For example, twenty students are initially divided into five groups and the teacher has to arrange the activities of each group of students for the coming six weeks, as shown in the following table. The first group will carry out activities related to electronic modules in the first week, while at the same time the second and third groups conduct pneumatic modules, and the fourth to the fifth groups do design projects. In the third week, the first and third group will work with the design projects; the second group conducts electronic module related activities, while the fourth and fifth groups conduct pneumatic activities, and so on.

Group 1	Group 2	Group 3	Group 4	Group 5
Electronics module	Pneumatics module	Pneumatics module	Design project	Design project
Design project	Pneumatics module	Pneumatics module	Design project	Design project
Design project	Electronics module	Design project	Pneumatics module	Pneumatics module
Design project	Design project	Electronics module	Pneumatics module	Pneumatics module
Pneumatics module	Design project	Design project	Electronics module	Design project
Pneumatics module	Design project	Design project	Design project	Electronics module

VIII. Assessment methods of learning

Appropriate assessment can reflect whether students' learning achieve the desired objectives. The traditional assessment is to assess students' learning effectiveness through written examinations (such as tests or examinations), completion of assignment works and design folios. But in fact, even though the design work of a student failed to meet some requirements; it does not mean that the student failed to achieve the expected learning objectives. Therefore, the teacher needs to choose different assessment methods according to the learning objectives of individual projects or assignments, and also determine the assessment criteria. Also the tasks need to be carried out in stages in order to assess the overall performance of students.

(a) Functions of assessment

There are many forms of assessment methods in terms of functions. For examples,

formative assessment (進展性評估),

summative assessment (總結性評估),

diagnostic assessment (診斷性評估),

evaluation assessment (檢討性評估), etc.

(i) "Formative assessment" means to assess students' progress and performance and directly review with the students together, such that they can clearly understand what the next step will be and why it is so. Such assessments are suitable as medium term assessments during the course of the assignments to facilitate students to complete the entire work more effectively.

For example, when conducting S1 "Project activity - Book buckle", when students complete the design sketches, the teacher will have to do formative assessments to make students understand what areas in the designs need to be modified, and the next step is to choose the appropriate materials and tools. When conducting project activities or design assignments, teachers need to do formative assessments at the right time in order to know students' progress and difficulties in order to help them. Students will also understand what steps need to be taken next and the reasons.

(ii) "Summative assessment" is a more comprehensive and systematic assessment of students'

performance, it is suitable for a comprehensive assessment at the end of the semester.

For example, at the end of the first term of S1, a summative assessment should be conducted such that both the teacher and students know whether the teaching effectiveness in this term achieves the expected objectives. Students can also know about their learning outcomes.

(iii) "Diagnostic assessment" is to find out the reasons for learning difficulties, so as to provide appropriate assistance and guidance. Such assessments are used after conducting formative assessments or summative assessments. If it was found that certain aspects of learning objectives cannot be attained, the sources of the problems can be identified through diagnostic assessment, which enables the teacher to take appropriate remedial actions more easily.

For example, when conducting the "Project activity - Robotic pet race walking competition", if the robotic pets of some students failed to meet the requirements of the design specification, the teacher should conduct diagnostic assessment to explore the reasons of the problem. Is that some students failed to understand the principles of mechanical theories, the problems with design ideas failed to master those consideration factors in the choice of materials, or unsatisfactory techniques of making, etc.? When the teacher finds out the sources of the problem, he can make appropriate arrangement to tackle the problem and make students' learning become more effective.

(iv) "Evaluation assessment" is to compare students' learning performances against the expected objectives. In assessing the curriculum design, factors such as whether the establishment of objectives is appropriate or whether the requirements are too high or too low, etc. will be assessed to review if the curriculum is properly designed. Such assessments are applicable at the end of a term to assess the curriculum design of the past six months or a whole year. The curriculum for the new term will be re-organised based on the results of assessments.

For example, when the S2 curriculum has been implemented for one year, the teacher will need to conduct the evaluation assessment, checking problems





such as whether some requirements are too high or too low, whether the time for teaching activities and the teaching materials were insufficient, and whether the teaching sequences were appropriate, etc. After reviewing, the S2 curriculum for the coming year can be adjusted accordingly. Such assessments enable the curriculum to get much improvement.

and learning effectiveness in accordance with the aims of those learning elements. They also describe the standards the teacher expects students to achieve and the score weightings in various aspects. Students can clearly understand the teachers' expectations in their learning process or during the conduction of learning activities. They can also set the learning directions and abilities for development for themselves clearly.

(b) “Assessment criteria”

Assessment criteria are to assess students' performance

Example - Design the classroom library corner (model):

Items of assessments	Detailed contents	Percentage
(a) Investigation and analysis of the problem	Students can list the functions and analyse the classroom library corner List the design requirements to be achieved	10%
(b) Propose the design	Creative thinking and expression of different design ideas	20%
(c) The presentation techniques for drawing	Design ideas clearly expressed Effective drawing methods Proficient drawing technique Appropriate composition and ratio	30%
(d) Level of rigorous and accuracy of the design	Use the design ideas to explicitly and comprehensively express the design specifications	10%
(e) The expression ability of the library corner model	Choose appropriate materials and methods to make the library corner model	20%
(f) The library corner satisfying the design requirements	Evaluate whether the library corner model can satisfy those stipulated design requirements Make proposals for modification	10%

In the above example, the teacher listed the assessment items and requirements that students are expected to learn in detail, and obviously the proportion of scores for drawing technique was set relatively high. Students certainly understand that this design project is mainly to develop their drawing technique.

conducted in a variety of ways. In addition to the teachers conducting the assessment and providing feedbacks to students, they can also consider the following forms of assessment.

(c) Forms of assessment

Assessment methods can be in many forms and being

(i) "Student self-assessment" refers to the self-assessments and reviews by the students themselves on the quality of their artefacts or projects, as well as their learning attitudes in the process. A deeper understanding of their own strengths and weaknesses in learning can be achieved in the reflection, so as

to make improvements or consolidation in practices. Such assessments are more subjective and profound than the teachers' assessments in general.

(ii) "Peers / small group assessment" refers to assessing peer students' artefacts or projects as an individual or in groups, such that students can observe each other and look for improvements. Such healthy assessment can effectively strengthen the exchange among students and the learning atmosphere among themselves. The peers can also take the chance to exchange their learning experiences and make the learning process more interesting. Anyhow, the teacher has to prevent insulting criticism among students, and let students be more candid in accepting different opinions raised by the peers or students within the group.

(iii) "Scoring marks / Verbal / Written assessment" means that there can be different feedback methods to assess students' performances, the teacher may choose marks, verbal or written modes, or their combinations to provide feedbacks to students, and all these modes have their own characteristics. For example, scoring marks is fast and direct in

letting students understand their level of learning performance, but there is not much feedback and so the impression is not deep enough. Verbal interaction can increase mutual understanding of ideas so that students clearly understand the resulting assessment. The use of text for assessment can clearly express how the teacher assesses the performance of students' artefacts and projects. If the comments are appropriate the students' benefit will be even greater and the impression deeper, it also allows students to reflect on their own learning performance and areas that need improvements.

Teachers should choose the appropriate assessment methods at different stages and learning strands based on the requirements of the curriculum, so as to understand students' performance and progress, improve the teaching methods, review appropriateness of the curriculum design, and suitability of materials selected, etc. Hope all these can enhance the effectiveness of learning and teaching, and create a more ideal learning environment for students and increase their interest in learning

