

Technical Studies Syllabus

Lower Secondary

Normal (Technical) course



©Ministry of Education
All Rights Reserved
Year of Implementation from 2001

CURRICULUM PLANNING & DEVELOPMENT DIVISION
MINISTRY OF EDUCATION
SINGAPORE

Contents

		page no
	aims	3
1	introduction	4
2	description of subject	4
3	rationale and objectives	4
4	nature of programme	4
5	course outline	7
6	assessment guidelines	12
7	suggested references	15

aims

- to develop knowledge of a range of common materials and basic processes
 - to develop appropriate technical skills for the construction of projects
 - to develop basic graphical skills for communication
 - to develop an awareness of possible hazards in school workshops and encourage safe working habits
 - to inculcate desirable work attitudes and pride in workmanship
 - to develop an understanding of some aspects of technology
 - to promote the use of information technology in the coursework where appropriate
-

technical studies *for* lower secondary

1 introduction

Technical Studies is a compulsory examination subject developed for the lower secondary level of the Normal (Technical) course.

The revised Technical Studies lower secondary syllabus takes into account the use of IT and the infusion of thinking skills and National Education messages - the three initiatives arising from the "Thinking Schools Learning Nation" vision.

2 description of the subject

The subject involves:

- the study of the 3 basic materials - wood, metals and plastics
- the acquisition of manipulative skills through the use of hand tools and simple machines
- the use of basic technical graphics and IT, where appropriate, for communication

3 rationale and objectives

Technical Studies is included in the curriculum to contribute to the all round development of pupils. The programme aims to provide pupils with an understanding of the common materials around us and the processes used to shape these materials. The programme is also designed to contribute to their

psychomotor development and the inculcation of desirable work attitudes through the acquisition of practical skills and construction of artefacts.

The syllabus is intended to prepare pupils progressively to take the subject at GCE 'N' level when they progress to the upper secondary level.

4 nature of programme

As illustrated in figure 1, the emphasis of the programme is on practical activities. Pupils will acquire knowledge on materials, tools, processes and graphics mainly through their involvement in structured practical projects. The **Framework for the Lower Secondary Technical Studies programme** listing the respective areas and its relative weighting is provided in table 1 on page 5.



figure 1: the practical oriented programme

contents		weighting
1	materials - wood, metals, plastics	10%
2	tools & processes - marking-out and measuring, cutting, shaping, bending, forming, jointing, finishing	10%
3	safety - general workshop rules, safety precautions and consciousness	5%
4	graphics - freehand sketching, reading drawings, isometric and multi-view drawings	15%
5	practical activities - structured projects	60%
total		100%

table 1 : framework for lower secondary technical studies

course outline



5 course outline

secondary 1

I materials

- wood
 - types of solid timber - jelutong, meranti
 - types of manufactured boards - chipboard, plywood, softboard
- metals
 - ferrous metals - mild steel, tool steel
 - non-ferrous metals - aluminium, copper, tin
- plastics
 - thermoplastics - acrylic, polyvinyl chloride (PVC)

II tools and processes

- marking-out and measuring
 - dividers, marking gauge, marking knife, odd-leg calipers, punches, scriber, steel rule, try square
- cutting and shaping
 - bench drilling machine, chisels, coping saw, countersinking bit, files, hacksaw, hammers, mallets, rasps, scroll saw, smoothing plane, surfboards, tenon saw, twist drill
- jointing
 - glues, nails, rivets, screws, solvents
- finishing
 - buffing machine, emery cloth, glass paper, lacquer, liquid polish, paints

III safety

- safety precautions relating to
 - general workshop practices
 - tools and processes

IV graphics

- freehand sketching
 - straight lines (horizontal, vertical and slanting), circles
 - outlines of objects using grids and the guidelines, proportions and outline (GPO) method
- reading drawings
 - working drawings

V practical activities

- structured projects
 - construction of projects using materials, tools and processes listed in I and II on page 7

secondary 2

I materials

- wood
 - types of wood - ramin, teak
- metals
 - alloy of non-ferrous metals - brass
- plastics
 - thermoplastics - nylon, polyethylene, polystyrene
 - thermosets - glass reinforced polyester (GRP), melamine

II tools and processes

- marking-out
 - sliding bevel, templates
- cutting
 - hole saw, snips, spokeshaves
- jointing
 - rivets, screw threads
- bending and forming
 - formers, jigs, oven, strip heater

III safety

- safety precautions relating to
 - tools and processes

IV graphics

- isometric drawing
 - using grid paper
 - using plain paper
 - using CAD software (where appropriate)
- multi-view drawing
 - first angle projection
 - drawing of 2 or 3 views of solids given the pictorial views
- reading drawings
 - working drawings and diagrams

V practical activities

- structured projects
 - construction of projects using tools and processes listed in II on page 9

assessment guidelines



6 assessment guidelines

- **semestral assessment (SA)**

There are two semestral assessments a year, one at the end of each semester. The details of the examination structure proposed for both Sec 1 and 2 are provided in table 2 on page 13. Details of the respective papers are:

paper 1:
(written) *30% of marks for subject.*
This is a formal timed examination in which pupils will be required to show:

- their knowledge and understanding of materials, tools and processes;
- their ability to read working drawings/diagrams and solve graphical problems

paper 2:
(coursework) *70% of marks for subject.*
Pupils are expected to complete a series of structured projects assigned by their teacher/s and will be required to demonstrate competency in working with a range of materials, tools and processes.

Details of each of the 2 papers are provided in table 3 on page 14.

- **continual assessment (CA)**

Continual assessment forms an integral part of the teaching-learning process. It can be regarded as a kind of formative evaluation, the aim of which is to find out how effective the teaching process has been and the strengths and weaknesses of the pupils with a view to taking corrective measures where necessary.

Teachers have the flexibility to decide on the methods of testing (e.g. written assignments, parts of or a whole practical project) when conducting CAs. However, in order to obtain an accurate assessment of the pupils' progress, it is essential to ensure that the 'tests administered' measure both theoretical knowledge as well as competency in the practical projects. The weighting for both the components (i.e. 30% for theoretical knowledge and 70% for practical projects) should be maintained when incorporating pupils' attainment in CAs into their overall performance in the subject for the semester/year.

semester	component	duration	weighting	weighting sub-total
first (mid-year exam)	paper 1 written	1 hour	12%	40%
	paper 2 coursework	-	28%	
second (final exam)	paper 1 written	1 hour	18%	60%
	paper 2 coursework	-	42%	
total weighting				100%

table 2 : examination structure for secondary 1 & 2

paper 1: written					
part	section	item type	number of questions to attempt	marks	weighting
a: materials, tools & processes	I	multiple-choice	10	20	15%
	II	free response (short answer type)	10	30	
b: graphics	-	reading of working drawings/diagrams and those requiring graphical solutions	2	50	15%
paper 2 : coursework					
project construction			3 or 4 projects per semester	100	70%
total weighting					100%

table 3 : details of examination papers for sec 1 & 2

7 suggested references

no	title	author	publisher	year
1.	Access Technology Electronics	John Cave	Thomas Nelson and Sons Ltd	1994
2.	An Introduction to Craft, Design & Technology	Stewart Dunn	Collins	1986
3.	An Introduction to Graphic Communication	Abate/Umberto	Longman	1995
4.	Basic Electronics	Malcolm Plant	Hodder & Stoughton	1990
5.	Basic Electronics	David Parsons	Macmillan Education Ltd	1988
6.	Beginning Graphical Communication	Jordan, Hawtin & Neil	Longman	1984
7.	Collins Complete Woodworker's Manual	Albert Jackson & David Day	Collins	
8.	Collins Design & Make Assignments	Stewart Dunn	Collins	
9.	Collins Electronics Tasks and Assignments	Stewart Dunn	Collins	
10.	Craft & Design in Metal	David M Willacy	Hutchinson	1986
11.	Craft and Design in Wood	David M Willacy	Stanley Thornes	1992
12.	Creative Technology	J Aitken & G Mills	Holmes Mcdougall	1987
13.	Design & Make It!: Electronic Products	Dave Mawson, Paul Bell, Philip Poole, Tristram Shepard	Stanley Thornes	1997
14.	Design & Plastics	Mike Hall	Hodder & Stroughton	1988
15.	Design Drawing One, Two and Three	John Rolfe	Hodder & Stroughton	1984

7 suggested references

no	title	author	publisher	year
16.	Electronics	R A Sparkes	Hutchinson & Co (Publishers) Ltd	1978
17.	Elementary Electronics	Mel Sladdin	Hodder and Stroughton	1983
18.	Enjoying Electronics	Owen Bishop	Press Syndicate of the University of Cambridge	1983
19.	Funway into Electronics Vol 1 – 2	Dick Smith	Dick Smith Electronics Pty Ltd	1995
20.	GCSE Technology - Electronics	Anthony Edwards and Steve Rich	Stanley Thornes (Publishers) Ltd	1990
21.	GCSE Technology – Mechanisms	Steve Rich & Anthony Edwards	Stanley Thornes (Publishers) Ltd	1991
22.	GCSE Technology – Structures with Mechanisms	Steve Rich	Stanley Thornes (Publishers) Ltd	1991
23.	Introducing Technology – A text for Australian secondary schools	Basil Slynko	Moreton Bay Publishing	1991
24.	Introducing Wood & Metal	J Perry & W Frost	Macmillian	1986
25.	Plastics for Schools	Peter J Clarke	Mills & Boon	1980
26.	Product Design	S Atkinson & C Mockford	Oxford	1991
27.	Starting CDT	Keith Good	Heinemann	1987
28.	Starting Points – Project Ideas for CDT	J Poole & J Sage	Macmillian	1987
29.	Technical Studies 1 & 2	CPDD	Longman	1994/1995

7 suggested references

no	title	author	publisher	year
30.	Technology Activity Book 1 & 2 (Teacher's Edition with Answers)	E Mazurkiewicz & B Slynko	Moreton Bay Publishing	1995
31.	Think Out Of The Box	Mike Vance & Diane Deacon	Creative Thinking Association of America	1995
32.	Woodwork Projects	T Driscoll & E Hibberson	Macmillian	1986
33.	Working with Materials	Colin Chapman & Mel Peace	Collins	

Footnote: The list of reference books above is by no means exhaustive. It is included to provide teachers with an array of reference materials which teachers may wish to draw upon as resource materials for the teaching and learning of Technical Studies. Some of the books listed are content based while others are for personal development in creative thinking and design related knowledge. It is hoped that schools would build a repertoire of reference materials for teachers' and pupils' reference.