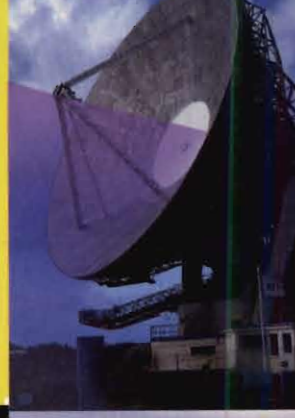
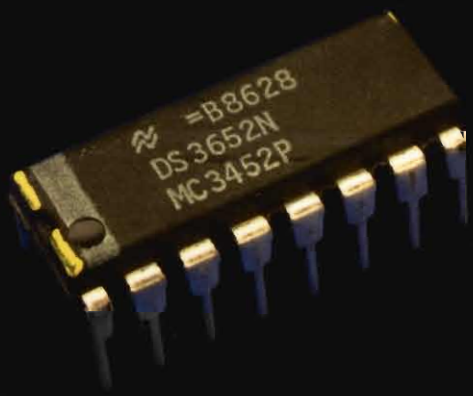
Technology



Secondary Education

First year



National Center for Research and Development

National Textbook

New Curricula

Republic of Lebanon

Ministry of National Education, Youth and Sports

TECHNOLOGY

Secondary Education

First year

National Center for Educational Research and Development

National Textbook

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TECHNOLOGY

Secondary Education
First year

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... WE BUILD THROUGH EDUCATION

Four years ago, under the leadership of the Minister of National Education, Youth and Sports, the National Center for Educational Research and Development (NCERD) initiated the overall reform of the educational system in Lebanon. Today, NCERD is pleased to present the first collection of textbooks, developed in conformity with the new curricula announced by decree no. 10227, dated the 8th of May, 1997, to all those involved in the education sector.

This collection covers the first year of each of the three basic education cycles, as well as the first year of the secondary cycle. It will be followed, over the next two years, by the textbooks addressed to the remaining two years of each cycle.

The publication of these textbooks follows directly from previous steps undertaken as part of the overall effort to rebuild the educational system. The Plan for Educational Reform, the adoption of a new educational ladder, the new curricula and the new textbooks are all part of a continuous and coherent reform effort. The reform process views the education of the individual learner as a means to develop citizens capable of serving their country and self-confident adults ready to face the challenges of the twenty-first century.

Textbooks play an important role in this ambitious project because they embody the educational and civic objectives of the new curricula. In keeping with the spirit and philosophy of the new curricula, a large number of specialists who had contributed to shaping the new curricula were called upon, from both the private and the public sector, to become members of author committees. The Higher Committee for Planning and the Advisory Committee, which were created by NCERD to oversee the whole reform process, closely monitored the development of the new textbooks. In addition, NCERD sought the assistance of experts from outside Lebanon.

However, we do not claim that the textbook we present to you today is perfect, or that it does not require any revisions whatsoever. Our work is certainly far from complete. After thirty years of stagnation, it was important to act and to do so promptly. We thus considered it appropriate to view this first edition as a starting point and to subject the first collections to the classroom test. A textbook's strengths and weaknesses can really only be identified in the classroom. It is now

up to teachers and students to evaluate these new textbooks. Thanks to their collaboration, we should arrive at concrete proposals for the improvement of subsequent editions.

It should also be pointed out that textbooks have become only one of many available sources for the transfer of knowledge. Indeed, our students are confronted with a constant deluge of information from a variety of media. Consequently, it becomes imperative for students to "learn how to learn" from textbooks, as well as from other sources. This means that we must adopt new work and teaching strategies in order to transform the classroom into an interactive space between a dynamic and enterprising learner and an informed teacher. The teacher's role must lie in assisting the student to acquire knowledge and competencies, to heighten his or her critical sense and to develop teamwork and participatory skills. This is why the educational reform calls for teacher training, the establishment of a structure capable of advising teachers and providing guidance and counseling to students, and the modernization of the exam and evaluation systems to be undertaken alongside the development of new textbooks.

Our attention is now focussed on the next three years. This period will provide an experimental phase, not only for the new textbooks, but also for all the activities that have preceded or accompanied their launch. Thus, the next three years should be viewed as an evaluation phase for the overall educational system of Lebanon.

Finally, I wish to thank sincerely all those who contributed to writing, editing, designing and producing the new textbooks. We hope that our combined efforts to build the future for the children of Lebanon will contribute to the reconstruction of our country.

Beirut, July 22, 1998

President, NCERD

Mounir ABOU-ASSALI

Preface

The present book conforms with the new curriculum concerning the Secondary Cycle.

As part of the New Curriculum, decree No 20/M/1997, Technology, as a discipline, is the first attempt to exploit knowledge into concrete application. All along this course, students are exposed to the latest technical improvements that will guide them in choosing the right profession.

The suggested projects integrate the knowledge and the know-how of many disciplines. The book consists of worksheets prepared for individual or group use.

The suggested technical devices are familiar and common to the students.

Each project consists of a set of activities which aim towards assembling innovated or ready made elements.

These projects will gain more meaning through field trips to specific sites and exposure to lectures and demonstrations conducted by specialists in the field.

1. GENERAL OBJECTIVES

In technology education and by reason of their influence on the technical , economic and social evolution certain domains were given the privilage of selection on others; thus forming a step in technology towards a technical culture. Learning about such domains will , as time goes on, enable as to tackle technical problems resulting from the rapid progress in technology and means of production.

The objective of technology education is to establish a symbiotic relationship between conceptual understanding and practical realizations of concepts.

2. SPECIFIC OBJECTIVES

At this leve , Technology Education aims at achieving objectives which enable the learner to:

- acquire an approach based on systems and their functions
- adopt an analytical attitude
- develop a sense of production
- realize models
- enhance critical thinking.

3. TECHNICAL DOMAINS / FIELDS

The aim of this discipline is to link work at school with the future production needs in society. All topics have socio-economic implications and involve the following fields:

1. Systems and Technical Skill

It allows students identify, analyse, use and evaluate the different functions pertained by systems.

2. Security and Precaution

It focuses on security aspects regarding materials and people and raises the awareness to adopt an attitude in dealing with such dangers.

3. Electronics

Projects will be realized based on given schematic diagrams and models ; it also respects the norms and standards of manufacturing.

4. Chemical industry

Projects accomplished will enable the student to acquire the skill of production, manufacturing, extraction of certain substances, recycling... Site visits will reinforce the comprehension and appreciation of industries.

5. Reproduction

Through research work, lots of information can be acquired on topics such as printing techniques and proper use of machines in reproduction.

4. EDUCATIONAL OBJECTIVES

1- Methodology:

The details of the manual work are presented in the worksheets. Worksheets consists of the following processes:

- Comparing information
- Choosing the appropriate methods
- Taking proper decisions
- Making the object.

2- Procedure

- Gathering information on the project
- Sorting out the information

- Choosing the object
- Applying prerequisite knowledge to make the object.

3- Exploration

- Each construction follows a set of given instructions
- Efficient use of time and space is maintained
- Safety measures to be followed
- Estimate cost to be calculated.

4- Communication

Students will be asked to:

- Share information
- Enhance their knowledge, know- how, and projection into the future
- Find out ways to improve production.

5. INTEGRATION

Applied technology is not restricted to manual work but is related to various disciplines:

- Studying needs
- Following operational steps
- Studying the market
- Estimating the cost of production.

Making an object also contributes to:

1. Vocabulary

- Written expression
- Correct language

2. Apply and become aware of scientific issues and their implications to the environment

3. Develop mathematical logic through:

- reasoning
- numerical presentation.

4. Enhance civic education through:

- Critical thinking
- Group work
- Assuming full responsability of the work done.

6. SPACE AND EQUIPMENT ALLOCATED TO THE TEACHING OF TECHNOLOGY

Technology sessions can take place in a classroom provided that it can accommodate such activities. An average area of $2.7m^2$ per student is necessary (for a clase of 18 students).

Closets (at least two) and shelves are required for storage.

The ideal situation would be to have a $100m^2$ workshop to accommodate 2 x 18 students with appropriate furniture and equipment (refer to the norms and standards of architectural programe. General teaching, Lebanon 1997, and to the lists of furniture and equipment).

7. SAFETY MEASURES

Safety measures are set to minimize the risk of accidents.

The working conditions must conform with the norms and the standards of safety measures.

The risk of electrocution is discussed in a separate worksheet. All other worksheets include a set of safety measures to be adopted.

8. EVALUATION

The evaluation of the activities is based on knowledge, and know-how. The acquired skills are measurable, and can be evaluated as follows:

Criteria	Indicators	Note%
- Scientific approach	- Clear, understandable with correct application	10%
- Functioning (Feasability)	- Correct shape, easy rotation no friction at the joints	50%
- Presentation	- Neat, attractive, good finishing	20%
- Marketing	- Well studied in a given economical context.	10%
- Innovation	- Personal work	10%
		100 %

A feedback is undertaken at the end of each cycle, since a desired behavior is targeted at a progressive rate.

Table nº 1

Scope and sequence of the contents

(Secondery Cycle - Classes 1 and 2)

Themes	Content		
	Class 1	Class 2 (Sciences)	Class 2 (Humanitie)
Systemes et Techniques	- Systems: . Structure, environment: control,verification, feedback, interface, entry/exist. . Representation by sketch . . Formalization. . Application: technical, ecological, physical, automated and computerized systems. . sensor - Optics: . Astronomical telescope. . Optical fibre: endoscopy - Techniques of reprinting: . Printing techniques . Printing . Photostats. **15 periods**	- Photos techniques: . Equipment and production. - Acoustics: . Ultrasonics: fields of use. . Acoustics of an auditorium. **4 periods**	- Photos techniques: . Equipment and production. - Acoustics: . Ultrasonics: fields of use. . Acoustics of an auditorium. **7 periods**
Electronics	- Electronics: . Use and familiarization with passive and active component: R, C, diodes, transistors, thyristor, remote control . Experimental approack. **7 periods**	- Electronics: . Oscilloscope: use, application. . Functions of communication. . Logical circuits. - Logic: . Bascules, coding and décoding. **8 periods**	
Energy		- Motor technology: . Mechanics: engine. . Electricity: production and distribution. - Micro-waves. - Furnace, radar. **6 periods**	- Motor technology: . Mechanics: engine. . Electricity: production and distribution. - Micro-waves. - Furnace, radar. **7 periods**
Chemical Industrie	- Chemical industry: . Paper industry. . Essence extraction (orange blosson, sage,...). . Enemal work. . Work and use of resin. **5 periods**	- Chemical industry: . Plastic production. . Water proofing. . Oil (saturated and nonsaturées). **4 periods**	- Chemical industry: . Petroleum and derivatives. . Perfumes . Pigment, dye. **4 periods**
Communication and Média		- Norms of technical drawing: . Perspectives. . Forms of rotation. . Projections / cuttings / sections . Valuation of drawings. - Stocking the information. **4 periods**	- Stocking information. - Cinema. - Advertising media. - Television (broadcast and reception) **8 periods**
Economcs and Management		- Contract. - Means of payment. **4 periods**	- Contract. - Means of payment. **4 periods**
Security and Protection	- Staff members, individuals. - Materials. - Environment. **3 periods**		
Total	**30 periods**	**30 periods**	**30 periods**

Table nº 1

Scope and sequence of the contents
(Secondary Cycle - Classes 3)

Themes	Contenu			
	Classe 3 (General Sciences)	**Classe 3** (Life Science)	**Classe 3** (Literature & Humanities)	**Classe 3** (Sociology & Economics)
Systeme and Technics	- Medecine and technology: . Techniques and equipment. - Cartography: . Techniques and means of detection. **5 periods**	- Medecine and technology: . Techniques and equipment. - Cartography: . Techniques and means of detection. **5 periods**	- Medecine and technology: . Techniques and equipment. - Cartography: . Techniques and means of detection. - Meteorology: forcast card. **9 periods**	- Medecine and technology: . Techniques and equipment. - Cartography: . Techniques and means of detection. - Meteorology: forcast card. **9 periods**
Electronics	- Electronics: . Functions: feeding, filtering oscillation, feedback, modulation. - Automatics: . Open, closedball (feedback). . Linear servo-control. **10 periods**	- Electronics: . Fonctions: feeding, filtering oscillation, feedback, modulation. - Automatics: . Open, closedball (feedback). . Linear servo-control. **10 periods**		
Energy	- Energy: . Solar energy and seting-up. . Conserving energy in a fluid. - Laser: fields of use. **5 periods**	- Energy: . Solar energy and seting-up. . Conserving energy in a fluid. - Laser: fields of use. **5 periods**	- Energy: . Solar energy and seting-up. . Conserving energy in a fluid. - Laser: fields of use. **5 periods**	- Energy: . Solar energy and seting-up. . Conserving energy in a fluid. - Laser: fields of use. **5 periods**
Industry	- Chemical industry: . Petroleum and derivatives . Perfumes . Pigment, dye. **4 periods**	- Chemical industry: . Petroleum and derivatives . Perfumes . Pigment, dye. **4 periods**	- Chemical industry: . Petroleum and derivatives. . Perfumes - Food processing industry: . Origin, conservation sterelization. **8 periods**	- Chemical industry: . Petroleum and derivatives. - Food processing industry: . Origin, conservation stereli-zation. **8 periods**
Communication and Media	- Numerical rotation: . Numerical telephone,television broadcasting, cable TV, high definition TV. **2 periods**	- Numerical rotation: . Numerical telephone,television broadcasting, cable TV, high definition TV. **2 periods**	- Numerical rotation: . Numerical telephone, television broadcasting, cable TV, high definition TV. **2 periods**	- Numerical rotation: . Numerical telephone,television broadcasting, cable TV, high definition TV. **2 periods**
Economics and Managment	- Monetary system. - Documents of purchase and sale. **4 periods**	- Monetary system. - Documents of purchase and sale. **4 periods**	- Monetary system. - Documents of purchase and sale. **6 periods**	- Monetary system. - Documents of purchase and sale. **6 periods**
Total	**30 periods**	**30 periods**	**30 periods**	**30 periods**

Table nº 2

Acquired competences
(1st. Year Secondary)

Theme	Ability	Competence (skills)
System	Inform Evaluate	- Identify a system. - Analyse a system.
Security and Protection	Realize (execute)	- Apply the elementary measures of security and prevention.
Electronics	Realize	- Realize an electronic circuit of current usage.
Optics	Realize	- Construct an optical system .
Industrial chemistry	Realize	- Prepare some products of commun usage.
Reproduction Tech.	Inform	- Acquire a critical attitude towards printing techniques.

List of Tools and Equipments

(Technology Workshop)

Level: **Secondary** / Local: **Technology workshop** / Capacity: **15 students**

Ref	Name	Type / Caracteristics	Quantity
E 01	Crocodile vernier caliper	Set 1/10, 1/20, stainless steel	03
E 02	Pliers	Set: black, red, yellow	01
E 03	Paper cutter (guillotine)	Paper, plastic, transparent sheet, 2mm - 300mm	01
E 04	Toolbox	Metallic or plastic with drawers containing: 1 x cutting pliers with stripping edge 1 x universal pliers with stripping edge 1 x set of 5 screwdrivers, OBC 5 1 x professional multi purpose scissors 1 x iron solder, 30 watts max., support 1 x protractor 1 x compass 1 x metallic ruler, 300mm 1 x center punch 1 x set of 3 limes for wood work 1 x set of 3 limes for metal work 1 x cutter with retractable blade, 6.5mm 1 x carpenter saw 1 x hammer 250g with aclaw 1 x stripping pliers for wire ends 1 x metallic meter, tape 2 - 3m 1 x screwdriver test, long nose 1 x mechanic saw with 5 blades	06
E 05	Diamond cutter	Ordinary type	01
E 06	Blade cutter	Retractable, 18mm	02
E 07	Square	200 x 300mm	02
E 08	Square set		01
E 09	Working bench	Rotatable base	06
E 10	Suction vice		02
E 11	Set of 6 screwdrivers	OBC 6	01
E 12	Set of 6 clamps		02
E 13	Hammer	300g, with claw	01
E 14	Plastic sheet		02
E 15	Sander	200W, 220V	01
E 16	Multimeter	VOM	02
E 17	Drill	13mm with support, 220V	01
E 18	Punch	Made of steel	01
E 19	Forceps		01
E 20	Glue gun		02
E 21	Hacksaw		02
E 22	Garden sheers	To cut branches	01
E 23	Hot plate	220V, 1000 watts approx.	01
E 24	Ribbon saw	Section: 30 x 100mm Power: 600W Source: 220V	01
E 25	Air compressor	50 liters, 220V	01
E26	Grinding machine	Ø 150mm, 220V	01
E27	Parallel sides vise	125mm, turnable base	06
E28	Termocling-film machine	300mm side 3mm thickness	01
E29	Jigsaw	6 blades to cut wood, plastic or metal	01
E30	Stabilizer	24V - 30V, 5 A	02

M: mobilier, E: équipement individuel, C: consommable

Ref	Name	Type / caracteristics	Quantity
E 31	Frequency generator	Waves: sinusoidal, square, triangular Frequency: 10HZ, 100 HZ. Output voltage: 0 - 10 V, 50 ohms. Out TTL: 0 - 5V. Output power: 2 - 5W. Input: 220V.	02
E 32	Oscilloscope	2 input terminals, power supply: 220V.	01
E 33	Multimeter	Analogic	02
E 34	Chronometer	Manual, 1/10.	01
C 01	Electrical accessories	Set of: 6 x plugs 6 x battery holders 6 x crocodile clips 6 x sockets 24 x bulbs (3V) 12 x bulb holders 10 x electric motor (toy)	02
C 02	Paper clips	Box (100 pieces)	02
C 03	Solder	100g, 10/10e	02
C 04	Cables (wires)	3 colors	03
C 05	Cardboard	Porous and normal, 400g	-
C 06	Pins	Box	01
C 07	PVC glue	225mL tube with a piston	06
C 08	Plexiglass glue	100g tube	02
C 09	Capillary film	200 x 300mm (package)	01
C 10	Drill	Set: Ø 0.8 - 1 - 1.2 - 1.5 - 2mm	02
C 11	HSS drill	Set of 9 drills	01
C 12	Cutting blades	Set: 6.5 and 18mm	02
C 13	Sawing blades	Set of 10 and a saw	02
C 14	Degraving liquid	1L bottle	01
C 15	Moulding material	1kg plastic bag	12
C 16	Colored polystyrene	330 x 290mm, 2mm thickness, set of 4 colors	04
C 17	Adhesive ribbon	Roll with support	02
C 18	Solvent	1L bottle	01
C 19	Integrated circuit	Industrial size	06
C 20	Commutator	1 set	06
C 21	Condensor	1 set	06
C 22	Diode	1 set	06
C 23	Speaker	1 set	06
C 24	On-off switch	1 set	06
C 25	Led	1 set (different colors)	06
C 26	Microphone	4 Ohms	06
C 27	Photoresistance	1 set	06
C 28	Potentiometer	1 set	06
C 29	Relay	1 set	06
C 30	Resistor	1 set	06
C 31	Thermistance	1 set	06
C 32	Transformer	220/110 - 6, 9, 12 volts	06
C 33	Transistor	1 set	06
C 34	Switch	1 set of different types	06
M 01	Kit	Saw and ribbon, drill, grinder 1400 x 800mm, solid wood	01
M 02	Closet	To accomodate tools, bits and pieces	01
M 03	Trolley	Boards and maps	02
M 04	Working area	Wooden board, 1100 x 550mm	07
M 05	Shelves	To hold tools and drawers	03
M 06	Stool	Wooden	15

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