



Teachers Guide

**Basic Education
Grade Seven**

Republic of Lebanon

Ministry of National Education, Youth and Sports

TECHNOLOGY

Pedagogical guide

Basic Education

Grade seven

National Center for Educational Research and Development



National
Textbook

New Curricula

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TECHNOLOGIY

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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

As part of the New Curriculum, Technology as a discipline is the first attempt to translate knowledge into concrete application. All along this course, students are exposed to the latest technological developments, and 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 technological devices are familiar and common to the students.

Each project consists of a set of activities which aims at assembling new or working with ready-made objects.

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

TECHNOLOGY Education at the Intermediate Level

1. General Objectives

Technology education reflects its interdisciplinary aspect. It is carried out in accordance with the educational reform plan and is aimed at achieving the following objectives:

- Exploiting specialized knowledge through concrete application.
- Appreciating the interrelationship that exists between analysis, conception, realization and the use of technological devices.
- The comprehension of the technological phenomenon in its evolutionary context.
- Learning about the diversity of the productive organizations and the relations that exist between technological progress and the economic and social developments.
- Familiarization with the various technological applications specially those which are related to the daily human needs.
- Choosing and implementing relevant technological solutions under existing constraints.

- Participation in civic education:
 - by developing a critical attitude concerning the various forms of the commercial communications.
 - by initiating in the individual the tendency to become a well-informed consumer.
 - by enhancing the value of sophisticated handicrafts.
- Extensive familiarity with technological terminology.
- Adherence to the prevention and safety rules.
- Rational use of materials and equipment.
- Development of creativity.

2. Specific objectives

Technology education at this level is aimed at achieving objectives which enable the learner to:

- Increase technological applications which have been already dealt with at the elementary level.
- Use proper and accurate technological language.
- Learn specific technological procedures where the choice of the best procedures results from taking the various criteria into consideration.
- Mobilize his knowledge in various disciplines in order to resolve real problems.
- Use the equipment and means of control at his disposal rationally, and abide by the rules of safety and the ergonomical principles.
- Develop a critical attitude as a gate pass to the world of technology.
- Acquire a technological culture that helps the learner's career choice.

3. Topics

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

a. Material: It helps students acquire the skill of treating metallic, non-metallic and synthetic materials through the production of technological objects.

b. Mechanics: Models are used as templates to make mechanical objects out of metallic, non-metallic and synthetic materials.

c. Electricity and Electronics: Technological objects made by using diagrams and models represent miniatures of actually functioning objects which conform with specifications and standards governing electric installations. Electronic circuits are simple and allow for further electronic initiation.

d. Energy: Technological objects, designed and executed, demonstrate different forms of energy (solar, hydroelectric, ...).

e. Daily-life Science: Technological objects executed under this topic enable students to acquire production, manufacturing and conservation skills, reinforced through site visits to related factories.

4. Educational objectives

a. Methodology: The details of the manual work are presented in the worksheets which consist of the following processes:

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

b. Procedure:

- Gathering information on the project.
- Sorting out the information.
- Choosing the object.
- Applying prerequisite knowledge to make the object.

c. 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.

d. Communication: Students will be asked to:

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

5. Integration

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

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

Making an object also contributes to:

Language

a. Enriching **Vocabulary**:

- Reinforcing writing skills.
- Using correct language.

Science

b. Awareness of **scientific** issues, their applications and their implications on the environment.

Mathematics

c. Developing **mathematical logic** through:

- Reasoning.
- Numerical presentation.

Civics

d. Enhancing **civic education** through:

- Critical thinking.
- Group work.
- Assuming full responsibility for 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 2.7m² / per student is necessary (for a class of 18 students).

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

The ideal situation would be to have a 100m² open area to accommodate 2 x 18 students with appropriate furniture and equipment (refer to the norms and standards of architectural program, General Teaching, Lebanon 1997, and to the lists of tools and equipments p.14).

7. Safety measures

Safety measures are set to minimize the risk of accidents.

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

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:

(Example: Evaluation chart for the construction of a technical object)

EVALUATION

Criteria and Indicators	Scale	Mark / 100
Scientific approach: Clear, comprehensible, correct application	30 %	
Functioning: Correct form, proper rotation and low friction at joints	20 %	
Presentation: Well done, attractive, remarkable finishing	20 %	
Commercialization: Done in a convenient economic standard	20 %	
Innovation: Creative and original	10 %	

A feedback is undertaken at the end of each cycle since a desired behavior is targeted at a progressive rate. (See table No 2, p. 13).

Table No 1
Scope and Sequence
 (Intermediate Level)

Themes	Content		
	Grade 7	Grade 8	Grade 9
Material	<ul style="list-style-type: none"> • Material of common use: <ul style="list-style-type: none"> - Making, using, protecting and treating (Metal and Wood) - Making glue <p style="text-align: right;">7 periods</p>	<ul style="list-style-type: none"> • Engraving (mordant for metal) <p style="text-align: right;">2 periods</p>	
Mechanics	<ul style="list-style-type: none"> • Tools and machines - simple tools: <ul style="list-style-type: none"> - Utilization • Technical drawing: <ul style="list-style-type: none"> - Initiation • Measuring instruments (length, mass, density,...) • Water mill. <p style="text-align: right;">16 periods</p>	<ul style="list-style-type: none"> • Musical instruments: <ul style="list-style-type: none"> - Characteristics - Functioning <p style="text-align: right;">4 periods</p>	<ul style="list-style-type: none"> • Transmission of movement: <ul style="list-style-type: none"> - Gear mechanics, guidance and transmission - Hydraulic press - Hoist - Reaction turbine <p style="text-align: right;">6 periods</p>
Electricity and electronics	<ul style="list-style-type: none"> • Electromagnet: <ul style="list-style-type: none"> - Application (crane, bell). - Lift <p style="text-align: right;">4 periods</p>	<ul style="list-style-type: none"> • Initiation with the help of an electronic board: <ul style="list-style-type: none"> - Simple mountings • Domestic circuits: <ul style="list-style-type: none"> - Circuits build up <p style="text-align: right;">18 periods</p>	<ul style="list-style-type: none"> • Sources of electrical energy: <ul style="list-style-type: none"> - Applications • Electronics, mountings of common use <p style="text-align: right;">12 periods</p>
Energy			<ul style="list-style-type: none"> • Forms: <ul style="list-style-type: none"> - Wind - Hydroelectric - Solar • Transformation and usefulness <p style="text-align: right;">5 periods</p>
Sciences in daily life	<ul style="list-style-type: none"> • Making and using glue. • Conserving plants, flowers, fish... <p style="text-align: right;">3 periods</p>	<ul style="list-style-type: none"> • Nutrition. <ul style="list-style-type: none"> - PH measurement, colourings and conservatives • Collecting and identifying minerals: <ul style="list-style-type: none"> - Rocks and fossils <p style="text-align: right;">6 periods</p>	<ul style="list-style-type: none"> • Food technology: <ul style="list-style-type: none"> - Fermentation - Nutrient extraction • Making antiseptics: <ul style="list-style-type: none"> - Soap - Detergent <p style="text-align: right;">7 periods</p>
Total periods	30 periods	30 periods	30 periods

Table No 2
Acquired Competences
 (Intermediate Level)

Theme	Ability	Competence (skills)
Grade 7		
Technology	Inform, document, communicate	• Have precise information about technology evolution, adopted terminology and domains of application
Matter	Communicate	• Acquire and restore knowledge in the following domains: - Wood treatment - Metal usage and machining - Preparation of glue and usage
Technical drawing	Lay-out execute	• Lay-out and execute a technical drawing of an object
Tools and machines	Use	• Manipulate with tools and simple machines properly
Measuring instruments	Utilize	• Utilize some measuring instruments properly (pressure, mass...)
Mechanics and electricity	Realize, execute	• Realize certain objects illustrating the relationship between force and energy, action and reaction
Conservation of collections	Inform, realize	• Acquire techniques and means of conservation of collections
Grade 8		
Nutrition	Communicate	• Determine and measure acidity and basicity of food
	Inform, document	• Know the technique of preserving some sort of food
Mineral, rocks and fossils	Analyse, criticize	• Classify and preserve minerals, rocks and fossils belonging to an ancient period
Matter	Execute	• Grind and scratch some sort of sketches on metals
Musical instruments	Construct	• Construct musical instruments: Cord, wind
Electricity	Realize, execute	• Execute an electric welding • Realize some electric circuits of domestic use
Electronics	Realize, execute	• Realize some circuits in valving diodes, transistors, transformers and motors • Execute simple electronic maintenance • Execute electric welding in electronic circuits
Grade 9		
Food technology	Analyse	• Distinguish between fermented and non-fermented food
	Realize	• Realize acetic fermentation: vinegar
	Realize	• Make a chart showing grains and derivatives
Electricity	Inform, document	• Identify the elements forming a battery
	use	• Use of batteries
	Realize, execute	• Construct a device rectifying an alternating current
Energy	Inform, document	• Identify the different forms of energy
	Realize, execute	• Construct some devices transforming a form of energy in to another
Electronics	Communicate, realize	• Find the functions of some electronic components built-up in an electronic circuit
Mechanics	Realize, execute	• Construct a device showing transmission of motion and conservation of energy
	Realization	• Apply concept of hydraulatics and conservation of motion
Today's chemistry	Realize	• Make soap, antiseptic products and detergents

List of Tools and Equipments (Technology Workshop)

Level: **Intermediate** / Placel: **Technology workshop** / Capacity: **18 students**

Ref	Name	Type / Characteristics	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
E 26	Grinding machine	Ø 150mm, 220V	01
E 27	Parallel sides vise	125mm, turnable base	06
E 28	Termocling-film machine	300mm side 3mm thickness	01
E 29	Jigsaw	6 blades to cut wood, plastic or metal	01
E 30	Stabilizer	24V - 30V, 5 A	02

M: mobile, E: individuel équipement, C: consumable

Ref	Name	Type / Characteristics	Quantity
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	Degrafting 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
M 01	Kit	Saw and ribbon, drill, grinder 1400 x 800mm, solid wood	01
M 02	Closet	To accommodate tools, bits and pieces	01
M 03	Trolley	Boards and maps	02
M 04	Working area	Wooden board, 1100 x 550mm	09
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