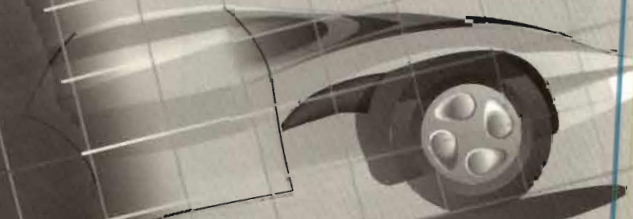
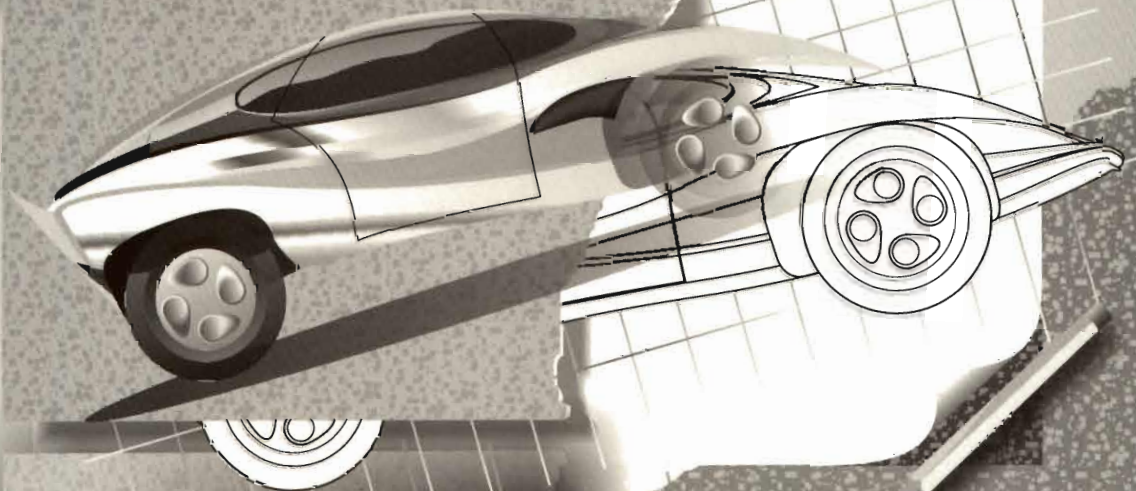


TECHNOLOGY

Grade 4 - Basic Education

PROJECT & REALISATION

Teacher's Guide



Republic of Lebanon

Ministry of National Education, Youth and Sports



TECHNOLOGY

Pedagogical guide ■

Basic Education

Grade Four

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TECHNOLOGY

Pedagogical guide ■

Basic Education

Grade Four

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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

INTRODUCTION

As part of the New Curriculum, Technology as a discipline is the first attempt to translate knowledge into practical application. Throughout this course, students are exposed to the latest technological improvements that will guide them to choose the right profession.

The suggested projects integrate the knowledge and skills 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 towards assembling innovated or 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.

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:

- The exploitation of specialized knowledge through concrete applications.
- The interrelationship that exists between analysis, conception, application and the use of a technological device or product.
- The comprehension of the technological phenomenon in its evolutionary context.
- Learning about the diversity of the productive organizations and the relations that exist between technical progress and the economic and social developments.
- The familiarization with the various technological applications specially those concerned with the daily human needs.
- The choice and the implementation of relevant technological solutions under existing constraints.
- Participation in the civic education:
 - * by developing the critical attitude concerning the various forms of the commercial communications.
 - * by helping the individual to become a well-informed consumer.
 - * by enhancing the value of the sophisticated handicrafts.
- Extensive familiarity with the technological vocabulary.
- Adherence to prevention and safety rules.

- Rational use of materials and equipment.
- Development of creativity.

2- Specific objectives

Technology education at the primary cycle level is aimed at achieving the following objectives which enable students to:

- Face concrete situations.
- Apply technological ideas using intellectual capacities.
- Initiate a technological way of thinking and experimenting: Conceiving, manufacturing, transforming and utilizing.
- Develop skills and aptitudes: objectivity, precision, creativity, sense of invention, working in groups.
- Recognize the social, historical and ethical dimensions of technology.
- Explore new situations.

3- Technical application.

The aim of this discipline is to help develop the skill of making technological devices which relate theory to practical applications.

All topics involved have a socio-economic implication and are related to the following fields.

1- Food industry and agronomy:

This topic provides the student with the techniques of food production, including safety measures and market studies.

Field trips aim at reinforcing knowledge and its industrial applications.

2- Electricity and Magnetism:

Models and labeled illustrations are used to make technological devices in accordance with applicable norms and standards.

Certain devices are set up to demonstrate the effect of magnets.

3- Mechanics:

Models and labeled illustrations are used as templates to make mechanical objects out of metals, non-metallic and synthetic material.

4- Other techniques:

All devices are imitations of real products. The purpose of such constructions is to acquaint the student with the skills of conceiving, constructing and applying knowledge. Field trips and models are used as means to reinforce industrial applications.

5- Preparing models:

Each model is first illustrated and then constructed or realized. (refer to Table 1)

4- Educational objectives.

1- Methodology:

Details of the manual work are presented in the worksheets. Worksheets cover the following processes:

- Comparing the appropriate methods.
- 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.
- Safety measures to be followed.
- Estimate cost to be calculated.

4- 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 only restricted to manual work but also relates to various disciplines:

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

Vocabulary:

- Written expression
- Correct language

Apply and become aware of scientific issues and their implications on the environment. Develop mathematical logic through:

- reasoning
- numerical presentation

Enhance 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 also required for storage.

The ideal situation would be to have a 100m² open area to accommodate 2x18 students with appropriate furniture and equipment (refer to the norms and standards of architectural program. 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.

Work conditions must conform to safety norms and standards.

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

8- Evaluation

The evaluation of activities is based on knowledge and skills. The acquired skills are measured and can be evaluated as follows:

<u>Criteria</u>	<u>Indicators</u>	<u>Note %</u>
- Scientific approach	- Clear, comprehensible with correct application.	10
- Functioning (Feasibility)	- Correct shape, easy rotation, no friction at the joints.	50
- Presentation	- Neat, attractive, good finishing	20
- Marketing	- Well studied in a given economic context.	10
- Innovation	- Personal work.	10
		<hr/> 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
(2nd Primary cycle)

Themes	Contenu		
	Grade 4	Grade 5	Grade 6
Food and Agronomy	-Preparation of foodstuffs: (ice-cream ...) 2 periods	- Preparation of foodstuffs: (Chips, biscuits, chocolate truffles). - Reading carefully the consumer's labels. 6 periods	- Preparation of foodstuffs: (cheese ...) - Cutting and grafting - Drop system irrigation 6 periods
Electricity and Magnetism	- Setting up circuits: . Electrical games. . Lighting a doll house. . making: a torch, games with a magnet (cars that run without an engine, magnetic theater), compass. . Basic principles of security. 10 periods	- Realization of simple circuits: - Making an electromagnet. 2 periods	- Realization of simple circuits: . Constructing an alternator, making an elevator, a simple electrical engine. . Producing electricity (wind + dynamo) 6 periods
Mechanics	- Simple Machines: . Making puppets and a jumping jack. . Constructing roundabout. 4 periods	- Simple machines: - Transmission and transformation of movement. . Constructing levers. . Instruments with cogwheels. . Constructing a Roberval's balance and Steelyard. . Constructing a winch and a windmill (salt extraction). . Constructing a wind sock. . Making a plumb line and a spirit level. 8 periods	- Simple machines - Transmission and transformation of movement - Transmission of movement by a chain - Making an anemometer 4 periods
Constructing models	- Making small boats with various materials - Constructing aeroplane and houses with various materials - Making fancy packages. - Paper production: boxes, badges, stars, masks, envelops, relief maps, kites. 8 periods	- Making a terrarium - Making an aquarium and reptiles farm - Making an incubator 6 periods	
Other Techniques	- Making recycled paper, pottery with clay, certain musical instruments. 6 periods	- Transforming a camera into a projector - Kaleidoscope - Making a camera - Making spindles to mix the colours - Making a stalactite 8 periods	- Constructing bridges with different materials: a montgolfier, a parachute, a solar panel. - Making a telephone, crystals. - To grow crystals. - To take photos without a camera. - A mirror to heat up things. 12 periods
Means of transport			Familiarization with the technological aspects in the field of transport (Subways, Highspeed train, Eurotunnel, Cable cars). 2 periods
Total periods	30 periods	30 periods	30 periods

Table No 2

Acquired Competences (Primary cycle)

Theme	Ability	Competence (skills)		
		Grade 4	Grade 5	Grade 6
Food and Agronomy	Sort, select,	- Choose, determine measure and mix food.	- Choose, determine measure and mix food.	-
	Analyse	-	- Read a label of production	-
	Realize	- Prepare a food product.	- Prepare a food product	- Apply techniques used in dairy - Apply some techniques of transplantation and agricultural irrigation.
Electricity and Magnetism	Realize, execute	- Dismount and remount different elements of a simple technical object. - Apply basic rules of safety	- Make an electro-magnet.	- Make some electric devices in current use.
	Sort, select	-	- Know-how to select the components of an electromagnet.	- Know-how to select some constituents of an electrical device.
Mechanics	Realize	- Design and construct a simple mechanical object.	- Verify a scientific notion - Realize a model	- Design and construct technological objects.
Making models	Shape	- Express ideas by means of sketches and schemes.	- Express ideas by making models and habitat of animals and plants	-
Various techniques	Realize	- Elaborate a project of manufacturing.	- Elaborate a project in the domain of optics and realize it.	- Know-how to use adequate materials while constructing simple objects - Apply modern techniques in manufacturing.
	Sort, select	-	-	- Make a model of a simple technical object.
Means of transport	Familiarize himself	-	-	- Know-how to use means of transport in our modern life.

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 vice	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 equipment, 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	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
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
M 05	Shelves	To hold tools and drawers	03
M 06	Stool	Wooden	18

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