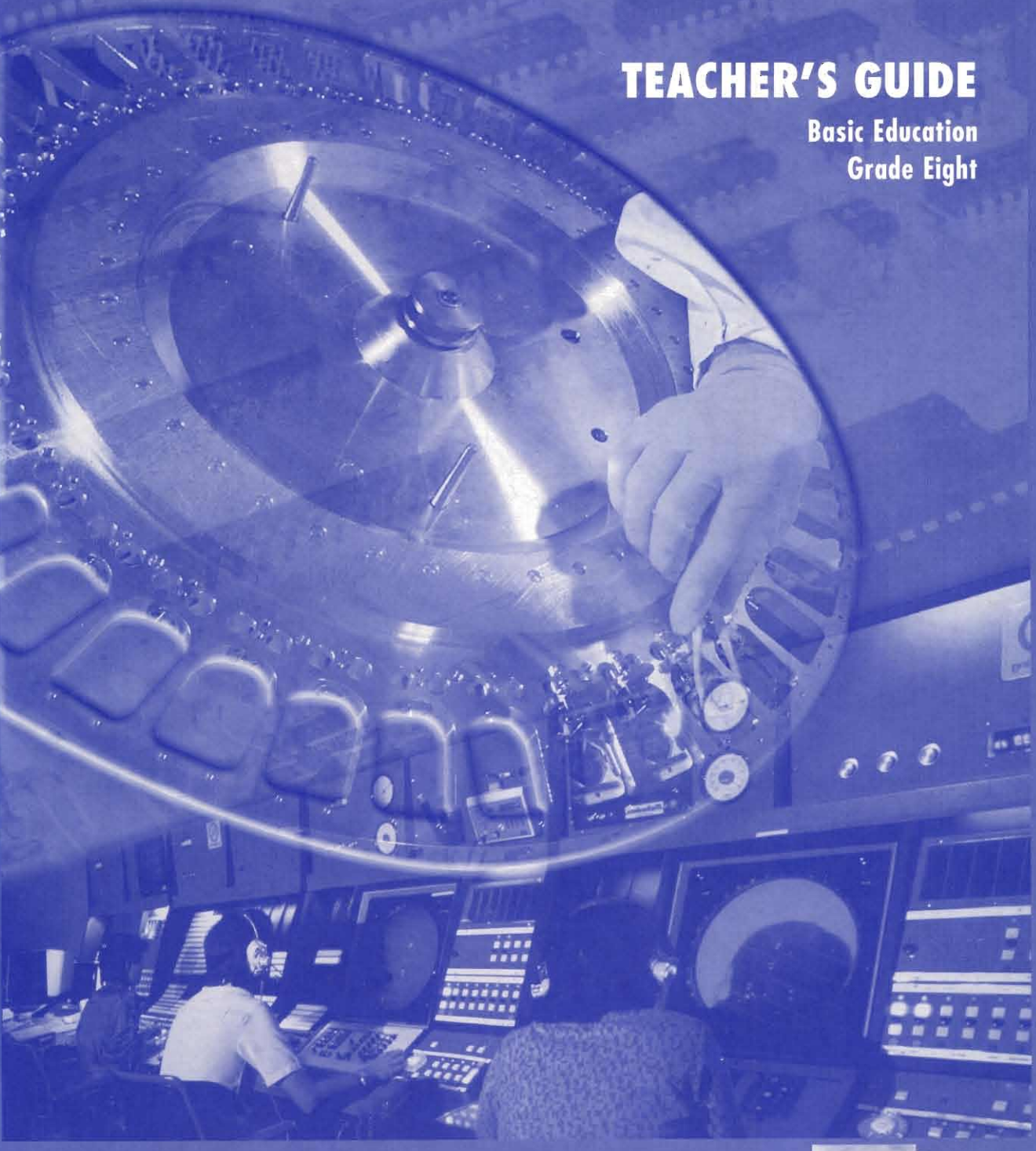
TECHNOLOGY



TEACHER'S GUIDE

Basic Education
Grade Eight

National Textbook New CURRICULA

National Center for Educational Research and Development

Republic of Lebanon

Ministry of National Education, Youth and Sports

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The National Textbook Project

This is the second installment of textbooks completed by the Center as part of a three-stage effort to produce the books called for by the New Curricula. We are placing these books in the hands of students with the great hope that we are moving, step by step, toward the goal of acquiring sound and modern learning, using sophisticated educational means and up-to-date methodology that encourage and reinforce individual thinking and research, the acquisition of skills, the development of ethical and national attitudes, the feeling of national belonging as well as the feeling of belonging to humanity at large.

The on-going revolution in information, communication and educational technology has undoubtedly limited the role of the textbook and lowered the rank it used so recently to occupy. However, in our society and in many other societies, the textbook remains the basic means of education, and it is our duty to exert our utmost effort and care to come up with the best product as to form and content. Yet we should not lose sight of the fact that the textbook is not sufficient by itself but should rather be used as a stepping stone to access other sources of information. What is important is to keep a clear vision and maintain the right course toward our objective. The means should not turn into the end and the student should always remain the focus of the learning/teaching process.

No one ignores or denies the fact that textbook writing requires very high academic and educational qualifications and very wide field experience. The authors committees undeniably possess such qualifications and qualities, yet last year's textbooks did contain some faults and gaps which were duly pointed out by researchers in many articles, and, indeed, we have benefited from some of them. Such is the nature of human work, no matter how good the intentions or how great the effort exerted.

Constructive criticism is a real contribution to raising the standard of authorship, minimizing errors and filling gaps. We only hope that criticism will always be objective and motivated by a desire to enhance educational reform in order to achieve better products.

A favorite adage handed down from our old scholars: "He who criticizes you is as helpful as a co-author". Let all criticism directed at the Center be of this caliber.

In closing, we hope that we all will have benefited from our experience and that the textbooks of the third and final stage be closer to realizing our hopes and more beneficial to our students. We are now preparing ourselves to assess the parts so far achieved of the new curricula and to assure that our educational movement is proceeding on the right track for achieving the best results.

June 2, 1999

President, National Center for Educational Research and Development

Nemer FRAYHA

Preface

The present book conforms with the New Curriculum concerning the Secondary Cycle.

As part of the New Curriculum (decree No 41/M/1998), Technology, as a discipline, is the first attempt to translate knowledge into concrete application. All along this course, students are exposed to the latest technical improvements that will guide them in choosing the right professions.

The suggested projects integrate the knowledge and the know-how of many disciplines. The book includes work sheets 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 original 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.

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. Nutrition: The projects help students acquire the techniques for presentation and conservation of food, as well as the determination of alkalinity and acidity.

b. Minerals, Rocks and Fossils: The technical objective is to develop the skill of sorting out and classifying minerals, rocks and fossils according to age.

c. Matter: The object in this field of study is to reinforce the technical skill of metal engraving.

d. Music: The realised projects aim at developing the skill of reading musical notes and making musical instruments.

e. Electicity: The realized projects enable students to read diagrams and build up given settups, conforming with functional specifications and following accepted norms and standards.

f. Electronics: This topic presents simple electronic circuits. It helps the students, through the use of printed circuit boards, to understand industrial electronics and the realisation of command circuits using a transition.

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 accomodate such activities.

An average area of 2.7m^2 / 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 100m^2 open area to accomodate 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	• Material of common use: - Making, using, protecting and treating (Metal and Wood) - Making glue **7 periods**	• Engraving (mordant for metal) **2 periods**	
Mechanics	• Tools and machines - simple tools: - Utilization • Technical drawing: - Initiation • Measuring instruments (length, mass, density,..) • Water mill. **16 periods**	• Musical instruments: - Characteristics - Functioning **4 periods**	• Transmission of movement: - Gear mechanics, guidance and transmission - Hydraulic press - Hoist - Reaction turbine **6 periods**
Electricity and electronics	• Electromagnet: - Application (crane, bell). - Lift **4 periods**	• Initiation with the help of an electronic board: - Simple mountings • Domestic circuits: - Circuits build up **18 periods**	• Sources of electrical energy: - Applications • Eectronics, mountings of common use **12 periods**
Energy			• Forms: - Wind - Hydroelectric - Solar • Transformation and usefulness **5 periods**
Sciences in daily life	• Making and using glue. • Conserving plants, flowers, fish... **3 periods**	• Nutrition. - PH measurement, colourings and conservatives • Collecting and identifying minerals: - Rocks and fossils **6 periods**	• Food technology: - Fermentation - Nutriment extraction • Making antiseptics: - Soap - Detergent **7 periods**
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, rochs and fossils	Analyse, criticize	• Classify and preserve minerals, rocks and fossils belonging to an ancient period
Matter	Execute	• Grave 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 velving 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 hydraustatics 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 equipement, 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 accomodate 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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