Section 3

CENTRE FOR THE MANUFACTURE OF TEACHING AIDS AND EQUIPMENT : TURKEY

Background

Primary education in Turkey is free and compulsory for a period of five years in the six to 14 age-bracket. Three-year regional primary boarding schools exist in addition to the usual day schools, especially in rural areas. Turkish is the medium of instruction. Class sizes average about 45.

Up to the end of the 1974/75 academic year, successful completion of primary education was marked with the award of a certificate. This practice has ceased with the coming into effect in 1976 of the new eight-year minimum basic education.

Secondary education lasts for six years, three of which are spent in middle school (orta) and three in high school (lycee). There are no specialized courses in middle schools: the programmes offered are career-oriented. Middle schools are either independent or are attached to high schools.

The high school prepares students for higher education, for the professions, and for the necessities of life. In the first year, termed a career-selection grade, general education, professional and technical courses are offered. At this grade, students sample different kinds of courses to find out the type of career that suits their aptitudes and inclinations. In different sections of the second year of high schooling, two kinds of programmes - literature and science - are offered to prepare students for higher education. There are four different kinds of programme in the third year of high school; literature, social science/economics, math/physics, and natural science. In each of these programmes, there are common, compulsory, special and elective courses. Turkish is the medium of instruction, but foreign languages like English, French and German are taught. The normal class size in middle and high schools is 40, though class sizes of 75 and 80 are not unknown.

A few experimental schools (nine as at present) exist. These make the introduction of innovations into the school system relatively easy.

Table 4 of educational statistics for Turkey, showing the number of pupils in the country who attend state, private and minority schools at the primary, middle, and high-school levels, appears at the foot of page 28. It should be noted that the private schools in Turkey usually exist to serve the need of foreigners.

The Science Lycee

In 1964, the Ministry of Education established, with assistance from the Ford Foundation, a high school called the Science Lycee to provide a three-year course with a bias towards science and mathematics. The school began with very well-equipped laboratories, high staff-student ratio, and highly qualified staff. Its highly selective nature was evident from the fact that out of at least 10,000 applicants only about 300 were admitted. Its science programmes were adaptations of current American materials in the separate subjects of biology, chemistry and physics (i.e. the BSCS for biology, CHEM study for chemistry, and PSSC for physics). However, the Science Lycee is no longer the model school it was proposed to be. R.H. Maybury in his book Technical Assistance and Innovation in Science Education (John Wiley & Sons, New York, 1975) describes it as being now "an ordinary secondary school, struggling against the same problems of niggardly budgets, inadequate equipment, and indifference among teachers that afflict most secondary schools in most economically-deprived countries".

The Science Project (Fen Projesi)

In 1966, the Ministry of Education decided that the Science Lycee materials should be placed into other schools in Turkey. The first pilot effort began in Behceliever School during the 1966/67 academic year. In this exercise the Science Lycee staff assisted the Behceliever School teachers to use the course materials in all their science materials. This experience at Behceliever School led to the initial outlines of the framework for the large-scale extension of the Science Lycee materials that is described next.

In March 1967, the Ministry of Education set up a body called the Science Education Development Commission (SEDC) whose members were drawn from the Ministry of Education and Turkey's scientific community. The Commission gave priority attention to a pilot programme for extending the Science Lycee materials into other schools

TABLE 4: SCHOOLS AND PUPILS IN TURKEY

	1971/72		1972/73	
	No. of Schools	No. of Pupils	No. of Schools	No. of Pupils
State Primary School	39,100	5,076,166	40,154	5,268,811
Private Primary School	79	15,990	78	16,842
Minority Primary School	76	7,272	72	6,734
State Middle School	1,734	786,486	1,909	906,187
Private Middle School	87	18,031	67	15,856
Minority Middle School	17	2,231	17	1,945
State High School	423	235,525	490	257,068
Private High School	78	13,816	61	15,856
Minority High School	12	1,044	12	969

in Turkey. Schools drawn from Ankara, Istanbul, Aydiu, Erzurum and Izmir cities were designated as lycees participating in this pilot project. TUBITAK (Turkey's Scientific and Technical Research Council) agreed to act as sponsor of this pilot programme under a project entitled: "Research on the possibility of conducting Science Education at other Turkish Lycees using the courses developed by the Science Lycee Project."

The original project involved nine lycees including Bahceliever School and about 100 teachers and 8,000 students. It consisted of trying out the Turkish adaptations of the American materials in use in the Science Lycee.

In June 1970 a SEDC-commissioned evaluation study of the performance of teachers and students of the nine pilot lycees in this project over the three-year period 1968 to 1970, showed that the materials were not as successful in other Turkish lycees as they had been in the Science Lycee. However, with the recorded positive attitude of the pilot lycee teachers, apparent failure was attributed to a number of causes including such factors as insufficient time to complete the courses, heavy workload on both students and teachers, lack of motivation of some of the students, and teachers' lack of experience in taking full advantage of modern teaching methods.

According to the new school system, the curriculum at first year high school was to be a general diagnostic one. It was then to be followed by a system of specialized options in which students chose to pursue literature or science stream courses.

With the first year general science course based on a Turkish adaptation of the American Introductory Physical Science (IPS) programme, the SEDC enlarged the scope of its outreach by launching a three-year experiment at the beginning of the 1971/72 academic year. This new project, in which all the existing American adapted texts were revised, involved 100 regular lycees and 89 lycee-level teacher training colleges. (The latter offer a four-year course including education and the general curriculum.)

The 100 high schools were selected from all over the country according to the following criteria: (a) the number of students in classes should not exceed 40; (b) there should be sufficient laboratory and classroom space for the teaching of science classes; (c) classroom-laboratories should be equipped with chairs and flat-top tables on which groups of four students could work; and (d) in case of an increase in the number of students, there must be a suitable place around the school building for construction of new buildings.

With this experiment over, the SEDC has begun introducing the following revised materials printed at the Science Project Centre into all state high schools in Turkey:

(a) Textbooks prepared by the Commission and printed by the Ministry of Education. These books are normally sold to students at cost but are generally given to poor students without charge.

(b) Teachers' guide books. These are distributed free to teachers who need to use them.

(c) Translations of a variety of source books for teachers and students.

(d) Tests and evaluation materials.

(e) "News Bulletin of Modern Science Education" published by the Scientific Commission.

In addition to these printed materials, films and film strips related to the modern science programmes are being procured. Reproducing these films for use in schools is the task of the Film Centre of the Ministry of Education, but purchasing them and meeting their costs in foreign currency are the responsibility of the Centre for Science Project.

Science Project Staff

The six professional staff, with supporting administrative and clerical staff, are housed in the new building of the Ministry of Education headquarters. These professional staff are all former teachers in lycees, and most have already been on training courses in the U.S.A. The current head of the team is Mr. Nihat Gurpinar. The SEDC is an advisory body to this team.

In-service Training of Teachers

The teacher training implications for the Lycee Science Projects have been met in part, at least by a series of summer institutes. A considerable budget from TUBITAK has been made available to these institutes which have been staffed by university professors and members of the Project. These summer courses are being conducted all over Turkey. It is worth noting that in the early years of the Lycee Science Project, a number of American tutors participated in these courses, and it is no surprise that the institutes seem to have been modelled on the extensive National Science Foundation summer institutes that were a feature of the U.S. curriculum science during the 1960s.

SCHOOL MATERIALS MANUFACTURING CENTRE (DAYM)

Establishment and Functions

With the aid of expert assistance and cash for machinery and equipment from the Organization for Economic Co-operation and Development (OECD), the Ministry of Education set up the School Materials Manufacturing Centre (DAYM) in Ankara in 1961.

The main function of DAYM is to provide teaching materials for schools in Turkey. This it does by producing the bulk of the equipment and aids and by purchasing the remainder for distribution from local or foreign markets.

The Centre also serves two other functions. The first of these is to hold in-service courses during summer months for science teachers in order to train them to use and to repair laboratory equipment. For this purpose, mobile units are used. They are based in a few centres, and generally consist of a van, science equipment, tools and small machines for repair work, and audio-visual aids. They are staffed by able science teachers who travel around a province (particularly in deprived areas) helping science teachers with their teaching problems, introducing them to new mehtods and techniques in science education, repairing broken equipment, and giving demonstrations in practical lessons in rural schools where adequate facilities for such work are at present non-existent.

The second function of the Centre is to run day and/or evening courses for apprentices as well as evening courses for people who intend to learn a trade. The students involved are adults and out-of-school youths. The courses include machine tool operation, metal turning, die making, electricity, electronics, glassblowing, technical drawing and woodworking. Over 2,300 workers have received satisfactory training through this scheme over the past ten years.

Structure

Though the Center started with only 25 workers and four teachers in what was originally a day technical school, the DAYM now has a new building in addition to the old one, 580 workers and 18 workshops (soon to be increased to 30), manned by 34 teachers. The administrative staff are all ex-classroom teachers and still belong

to the teaching service. Of the 34 teachers, four are qualified engineers and four are Higher Education Technicians. The administrative set up includes: chiefs of various workshops (at present 18), a director, a deputy director, the head of the research development unit, the laboratory chief, five assistant directors responsible for personnel, education, public relations, commercial matters, and production, and 18 workshop chiefs.

Finance and Methods

DAYM is regarded as a Department and it is therefore financed as such by the Central Ministry of Education. Each year the Department of Education Aids within the Ministry of Education receives lists of schools' requirements from the Secondary and Elementary Education Departments. These requests are processed and passed on to the DAYM which then produces and sends the equipment to schools through private transport companies. A school's responsibility is simply to report receipt of equipment by writing to the Centre and to the particular Department under which it functions. If schools need supplementary equipment, they are expected to make direct contact with DAYM or local companies for supplies and pay out of their own school science vote. Records reveal that school requests are dealt with promptly by the Centre.

School Science Equipment

Science equipment for primary, secondary and teacher training levels in all types of materials (wood, plastics, steel and glass) are produced. In fact, apart from certain sophisticated equipment like microscopes and thermometers which are imported from Germany, the U.S.A., Israel and Japan, most of the school science equipment is produced by DAYM. It is estimated, for instance, that over 80% of the equipment required for teaching the Turkish PSSC-Physics is produced at the Centre.

To produce these instructional tools, the main raw materials that have to be imported are optical glasses; chemicals for metal plating; resistance wires (chrome oxide); magnets (horse shoe and bar types); Fe, Ni, A, Cu, components; and semi-manufactured musical instruments components.

The machines available at the DAYM for producing the instrumental tools are shown in the following table 5.

TABLE 5 : DAYM MACHINES

Machines	Quantity	Machines	Quantity
Automatic coil winding machine	4	Spring winding machine	2
Diffusion pump (for glass blowing)	1	Plastic injection press (for 2 kg. capacity)	1
Machines for optical workshops	1 set	Plastic injection press (for 1 kg. capacity)	1
Checking and control devices for optics shop	1 set	Plastic injection press (for $\frac{1}{2}$ kg. capacity)	1
Work dies for optics shop	1 set	Plastic blowing press (for bottle making - 2 litres capacity)	1
Checking and control instruments for electric and electronic workshops	1 set	Lathe	3
Special machines for the production of musical instruments	1 set	Polyester spraying machine	1

Table 6 on page 34 indicates the number of sets of equipment and aids produced and supplied to schools by DAYM during the period 1970 to 1973.

TABLE 6: INSTRUCTIONAL TOOLS GIVEN TO SCHOOLS IN THE YEARS 1970-73

Type of Instructional Tool	Number of Sets Given				
	1970	1971	1972	1973	Total
Lycee Modern Physics	88	94	105	100	387
Lycee Modern Chemistry	88	94	105	100	387
Lycee Modern Biology	70	76	90	100	336
Lycee Mathematics	125	126	150	100	501
Lycee Social Studies	115	445	200	100	860
General Science (Lycee + middle school)	60	670	220	500	1,450
Middle School Physics	100	40	340	-	480
Middle School Chemistry	120	40	340	-	500
Middle School Natural Science	100	40	340	-	480
Middle School Social Studies	100	210	350	500	1,160
Middle School Mathematics	125	152	300	500	1,007
Middle School Handicrafts	-	50	-	200	250
Primary School General Science and Natural Science	3,000	3,600	4,000	4,000	14,600
Primary School Social Studies	-	3,500	4,000	4,000	11,500
Primary School Handicrafts	350	-	400	400	1,150
Pre-School Education Instructional Tools	100	100	100	100	400
Middle School-Lycee, Lycee Level College Language Laboratory	-	9	10	10	29
Vocational - Technical Schools General Science	-	75	50	-	125
Grand Total	4,541	9,321	11,100	10,710	35,672