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Agricultural and Irrigation Education in Egypt

Mohamed Wafaie ABDELSALAM

Head, Irrigation and Hydraulics Department
Faculty of Engineering - Ain Sham University - Cairo

The three Ministries of Agriculture, Irrigation and Education are involved in agricultural and irrigation education and training in Egypt.

Historically, Egypt has been a great agricultural nation. Most Egyptians depend upon agriculture for food and fiber and agriculture is a major contributor to the national economy and to the welfare of the people. Agricultural education policy in Egypt was thus planned to be a strategy for accelerating agricultural development.

The structure of agricultural and irrigation education consists of three main categories:

1. *Secondary Technical Education.*
2. *Academic Education.*
3. *Continuing Education.*

Secondary technical education in agriculture and irrigation is widely spread in all the governorates to provide the country with qualified technicians.

Academic education is the responsibility of university faculties of agriculture and of engineering. They prepare the agriculture and irrigation engineers for the Ministries of Agriculture and Irrigation and the private sector. They also prepare scientific staff for research in agriculture and irrigation.

Continuing education programs are designed to keep such engineers well informed on new and modern technology in their respective field and

to update and refresh their knowledge.

In general, education in Egypt is free for all secondary level, technical and academic education. Continuing education courses, however, charge a tuition.

I - Agricultural education

1. Technical education

Technical education in agriculture is only possible at secondary level technical schools.

Requirement for technical education diploma:

Nine years elementary education
Three years technical agricultural school.

Mandatory education begins at age six, and the student that follows a regular program should graduate with a diploma at 19. Anyone who has a diploma is able to work as a technician in the public or private agricultural sectors.

The outstanding students aspire towards university faculties of agriculture.

The teaching staff are university graduates (B.Sc. in agriculture) who have attended a one-year pedagogical course. All teaching staff are

government employees and must retire at the age of 60.

Such teaching staff receive regular refreshing courses through seminars organized by the Ministry of Education in cooperation with the Ministry of Agriculture. The training program is designed to keep up with the economic, social and cultural development of the country, as well as recent research in the different fields of agricultural development.

The costs of such education are covered by the government. The present cost per pupil is about 200 L.E./year (150 US \$).

The problems faced by technical education programs are limited budgets, lack of machinery and laboratories for training, in addition to the large numbers of graduated technicians who cannot be absorbed by the local market in the agriculture sectors.

2. Academic education

Academic education is offered at three levels by the university faculties of agriculture; B.Sc., M.Sc. and Ph.D. levels.

Undergraduate education:

The requirements for a university degree are:

Nine years of elementary school.

Three years of secondary school.

Four years of university education at a faculty of agriculture (for a B.Sc. in Agriculture Science).

At present there are 16 faculties of agriculture at 13 universities located in the different governorates of Egypt. These faculties graduate about 3,000 students every year. The duration of study in each faculty is four years which represents eight semesters for theoretical and practical training. The students attend the first two years of general study (common courses) in agricultural science.

In the last two years (third and fourth year) the student can select one of the following specializations:

1. Soils and water.
2. Agronomy.
3. Plant production.
4. Horticulture.
5. Genetics.

6. Animal and poultry production.

7. Economics.

8. Crop protection.

9. Food technology.

10. Dairy.

11. Agricultural machinery.

Such specialization allows the student to pursue his or her own interests.

The special programs for each of the above fields consist of about 16 to 21 courses spread over four semesters.

In the soil and water section, for example, the student attends the following courses: soil chemistry, mineralogy, pedology, soil formation, soil classification, soil physics, soil microbiology, irrigation, agricultural mechanization, plant nutrition, soil fertility and fertilizers, soil reclamation, geology, soil/water plant relation, soil technology, soils of Egypt, horticulture, vegetables, agronomy, biochemistry and plant physiology.

The student spends at least four months during the summer holidays in practical training at any one or more of the agriculture sectors chosen by the faculty or by the student himself or herself.

The student's education is also complemented by farm visits and seminars.

Each faculty of agriculture has its internal regulations which fix the type and number of courses that should be taught.

The content of each course is prepared by the professor according to a planned outlined program fixed by the faculty.

Post-Graduate Education:

The university faculties award M.Sc. and Ph.D. degrees in agriculture sciences in the following fields of specialization: soils, animal production, agronomy, horticulture, genetics, agricultural machinery, poultry, dairy, food industries, crop protection, and agricultural economics.

The students are those who have B.Sc. degrees in agriculture with final grades not less than "good" and "very good" in the field of specialization. Faculties prefer the outstanding students for M.Sc. and Ph.D. programs who are working in the agricultural research institutes.

For the M.Sc. degree, the student should cover a plan consisting of 32 points of about ten courses plus a thesis.

The Ph.D. degree requirements are a M.Sc. degree, 32 points of course studies, a qualifying examination, and a thesis.

Research used in the M.Sc. and Ph.D. thesis is financed by the Ministry of Education, Ministry of Agriculture and various research institutes.

Teaching Staff:

Professors, lecturers, assistant or associate professors should hold a Ph.D. degree in their field of specialization. Besides that, the main criterion is the quality and quantity of their published research work. Most members of the staff in Egypt are permanent. If the faculty does not have tenured teachers for a particular discipline, the course can be taught by tenured teachers from a related discipline. Visiting personnel are very limited at present, although it is possible to be invited for shorter or longer periods (sometimes more than the academic year), inside as well as from outside the country.

Cost of Studies:

Academic education in Egypt is free as the government has the duty to develop and fund it. The cost to the government of each student/year is approximately 750 L.E.

3. Continuing education programs:

Regular and continuing education programs in agricultural fields are conducted to help develop, through the pooling of knowledge, new techniques in agricultural developments that are adapted to various conditions.

These training programs are organized by the Ministries of Agriculture, Land Reclamation and Irrigation.

Training programs are taught by leading senior agricultural specialists in Egypt. They come from the Agricultural Centre and its affiliated research institutes with the assistance and cooperation of personnel from the Water Research Institute, Desert Institute, National Research Centre and the private sector.

There are 24 training centers all over the country.

The trainees are those who are working in the various fields of agriculture.

The training is extended to agronomists and other specialists in agriculture coming from Africa, Asia and Latin America.

The training is both practical and theoretical. Practical work includes laboratory demonstrations, case studies, seminars, field trips and study tours.

The training courses, which are almost designed, implemented and considered as regular training courses, are:

Vegetable production, animal health, poultry production, cotton production, plant protection, agricultural service, soil improvement, integrated rural development, and project analysis.

The duration of each course is three months. The participants of these courses should have an agricultural education, at least a B.Sc. degree, and have three years experience in the subject matter of the course.

The cost of the course is 2,500 US \$ per participant. This cost covers all education costs, full room and board, medical care and pocket money allowance.

II - Veterinary medicine education

Veterinary medicine is considered as one type of agricultural education.

In Egypt there are seven university faculties of veterinary medicine all over the country.

The number of students graduated in each faculty ranges from 200 to 300 with an average total number of 1,800 per year.

The study period is five years, during which 30 courses are studied.

These courses involve basic science in zoology, botany, physiology, genetics, microbiology, economics, physics and biochemistry and veterinary science, anatomy, histology, clinical diagnosis, surgery, gynecology, pathology, pharmacology, panatology, meat hygiene, milk production, animal hygiene, infectious diseases,

animal breeding, animal management and poultry and rabbit diseases.

The qualifications of the teaching staff are as mentioned for the faculties of agriculture.

The Faculty of Veterinary Medicine awards a B.Sc. in Veterinary Medicine.

The graduated students are qualified to work in any professional activity in the public and private sectors of agriculture.

The scientific preparation enables the graduate to be an academic or researcher by following the M.Sc. and Ph.D. research programs.

III - Irrigation and drainage education

Training in the irrigation and drainage fields in Egypt consists of three categories: technical, academic and continuing education.

1. Technical education

This category of education is designed for the technicians who work for the irrigation and drainage sectors in Egypt.

Technical schools offer diplomas to students who spend 12 years in elementary and secondary schools plus two years technical education in the following branches:

Mechanical and electrical
Irrigation and drainage
Surveying
Land reclamation.

Teaching Staff: University graduates with at least a B.Sc. in engineering.

Education is free and financed by the Egyptian government through the Ministry of Education.

Problems: Lack of introducing modern methods and high technology in this category of education, hence, this category of technicians cannot easily follow scientific development in the fields of irrigation and drainage.

2. Academic education

This category is composed of undergraduate and post graduate levels.

Undergraduate Education:

Academic education in the fields of irrigation and drainage at the undergraduate level leads to a B.Sc. Degree in Civil Engineering specialized in irrigation.

The requirements for this degree are:

12 years of elementary and secondary school education and

5 years of university education in a faculty of engineering (civil engineering department).

Sixteen faculties of engineering, situated in the different governorates of Egypt, offer a B.Sc. Degree in Civil Engineering.

Duration of such education in the field of civil engineering and specializing in irrigation is five years:

- A preparatory year for basic sciences.
- Three years for civil engineering.
- One year for irrigation special courses.

Courses that are studied in the five years cover the following subjects:

Basic science: Mathematics, physics, geometry, chemistry.

Civil Engineering: Theory of structures, steel structures, reinforced concrete, strength of materials, soil mechanics, surveying.

Irrigation and Drainage: Hydraulics, hydrology, irrigation science, drainage, design of irrigation structures, planning of irrigation and drainage projects, navigation.

During summer vacations, students are required to spend two weeks every year in one of the specialised sectors as field training.

Post Graduate Education:

Most of the engineering faculties that belong to Egyptian universities offer M.Sc. and Ph.D. degrees in irrigation and drainage engineering.

Diplomas in irrigation and drainage are also offered by Cairo, Ain Shams, Alexandria and Assuit Universities.

For the M.Sc. degree, the student should have a B.Sc. in Civil Engineering of a high grade.

The program of study for the M.Sc. degree is:

- Six main courses in the fields of mathematics, irrigation, drainage, hydrology, hydraulics, water power, and irrigation structures.
- A thesis in a topic related to the field of irrigation and drainage.

The Ph.D. degree requirements are:

- B.Sc. with a high grade in civil engineering.
- M.Sc. in the field of irrigation and drainage.
- Research in the field of irrigation and drainage.
- A qualifying examination.
- A thesis.

Research used in the M.Sc. and Ph.D. degrees is financed by the Ministry of Education and the Ministry of Irrigation research institutes.

Teaching Staff:

Professors, assistant professors, lecturers are all highly qualified with Ph.D. degrees specialised in the fields of irrigation and drainage. Also published research is required for promotion from the lecturer level to assistant professor level and to the professor level.

Visiting professors from foreign universities are occasionally invited for short terms to join the

local staff of Egyptian universities in teaching and research.

Cost of Education:

The cost of university education in the field of civil engineering (irrigation and drainage) is estimated at about 750 L.E/student/year.

For Egyptian students this education is free of charge. The costs are covered by the government.

3. Continuing education

To update the knowledge of irrigation engineers and technicians, and also to acquaint them with new technology in the fields of irrigation and drainage, a continuing education program is used by the Ministry of Irrigation.

A training program in this category is managed by the Water Research Center of the Ministry of Irrigation. In this program training courses are designed for technicians, engineers of different levels, and managers and directors.

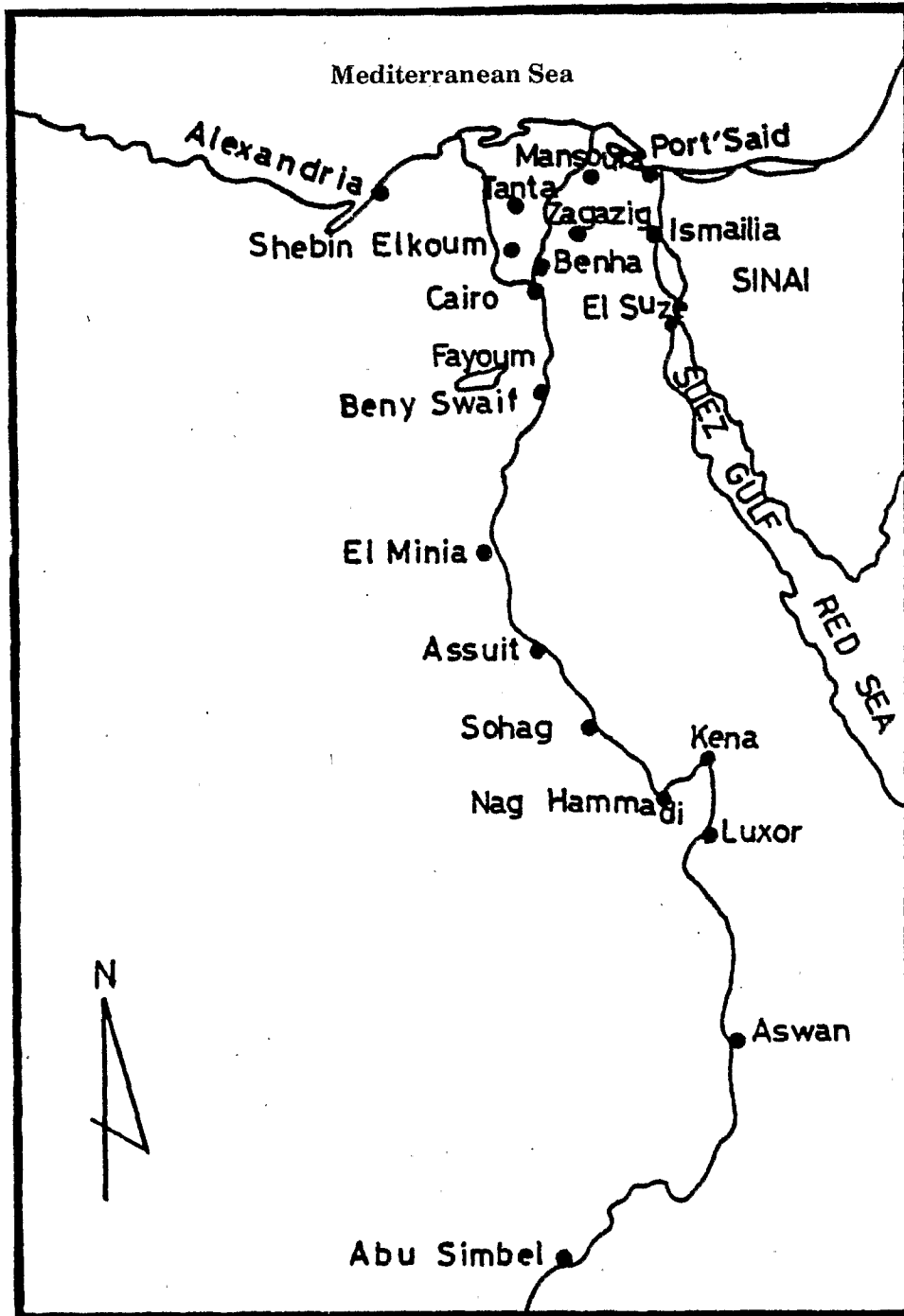
The duration of these courses ranges from one week to five weeks.

The subjects of these courses are:

Design of irrigation structures, quality control, construction management, operation and maintenance, and water management.

A detailed example of this type of training is presented in a separate paper entitled "Training as a Tool to Improve Water Management in Egypt".

Map of main training and university centers in Egypt



Annex 1

Figures and tables

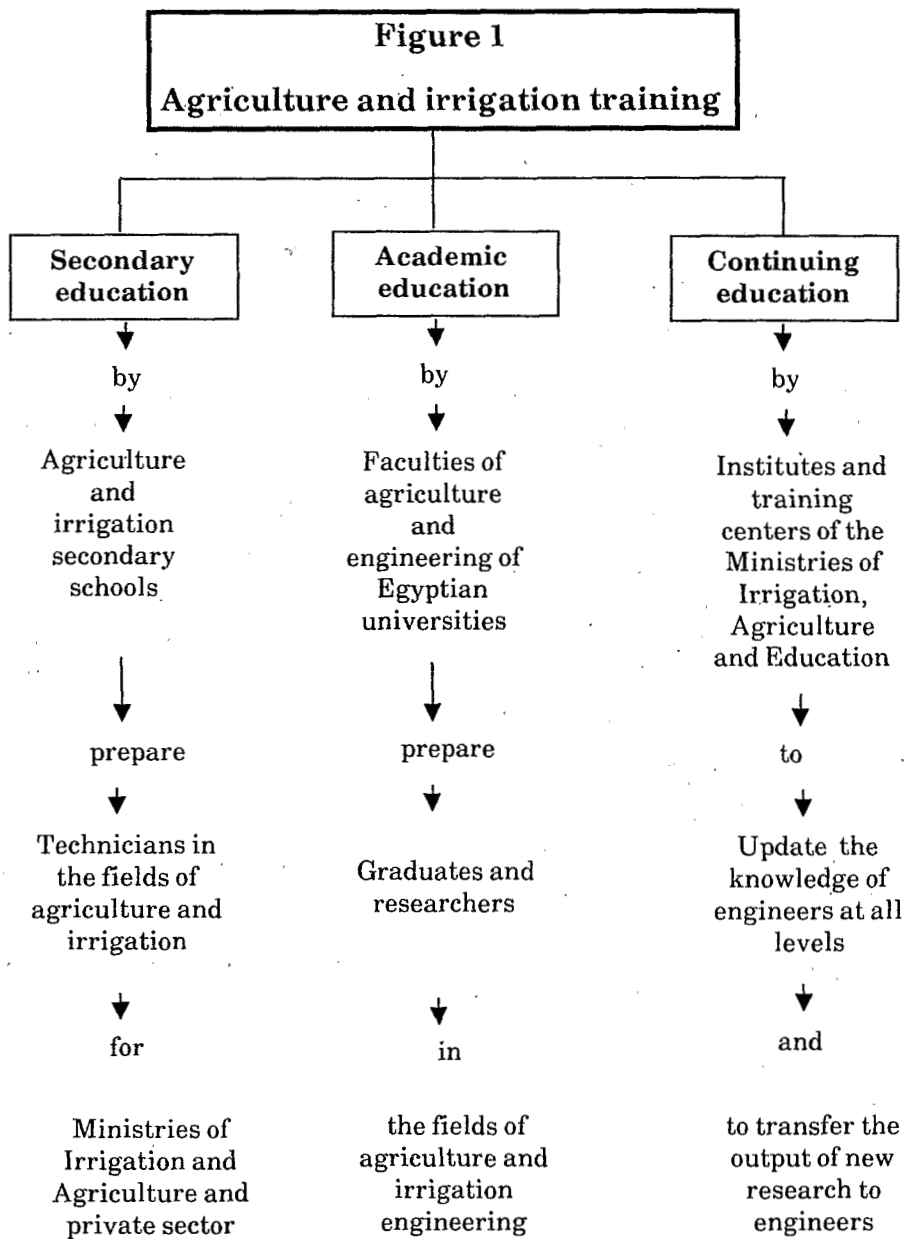


Figure 2
Agriculture Education

| | Technical education | Academic education | | Continuing education |
|----------------------------|---|---|------------------------------------|--|
| | | Undergraduate | Post-graduate | |
| Requirements | 9 yrs elementary 3 yrs tech. secondary school | 9 yrs elem. 3 yrs sec. 4 yrs univ. | B.Sc. Agr. M.Sc. Dip. Ph. D. | Any degree or diploma |
| Age | 19 yrs | 23 yrs | open | open |
| Teaching staff | B.Sc. in Agriculture | Ph.D. in agricult. | Ph.D. | B.Sc., M.Sc. or Ph.D., wide experience |
| Cost | 200 LE/year | 750 LE/year (free) | 750 LE/year (free) | Actual cost (not free) |
| Problems | Lack of Govern. budget | Large number | Finance of research | Contacts with the countries abroad |
| Number of graduates | Large number of graduates 25 000/year | 3 000/year | Varies | Varies |
| Specialities | General Agric. Basics | Soils & water, Agronomy, Plant Production, Horticulture Genetics, Animal & Poul. Prod., Economics, Crop Prot., Food Technology, Dairy, Agric. Machinery, etc. | | Designed according to requirements |

Figure 3
Irrigation & drainage education

| | Technical education | Academic education | | continuing education |
|----------------------------|---|---|---|--|
| | | Under graduate | Post-graduate | |
| Requirements | 9 yrs elem. 3 yrs second. 2 yrs Inst. Tech. | 9 yrs elem. 3 yrs second. 5 yrs univ. | B.Sc. Civ Eng. M.Sc., Ph.D. or <i>Diplôme</i> | Any degree or diploma |
| Age | 21 years | 23 years | open | open |
| Teaching staff | B.Sc. in Eng. | Ph.D. in Eng. | Ph.D. in Eng. or Agric. | B.Sc., M.Sc. or Ph.D., wide experience |
| Cost | 200 LE/yr (free) | 750 LE/year (free) | 750 LE/year (free) | Actual cost (not free) |
| Problems | Few graduates Lack of modern education tools | Large numbers | Finance of research libraries | Contacts with the countries abroad |
| Number of graduates | 500/year | 150/yr spec. Irrig. 4 000/yr Civil Eng. | Varies | Varies |
| Specialization | Irrig., surveying. Land recl., Mech. & Elec. | Irrig. & Drainage Civil Engineering | Irrigation & drainage fields | Irrigation & drainage |

| Year | Diploma | M.Sc. | Ph.D. | Year | Diploma | M. Sc. | Ph. D. |
|---------|---------|-------|-------|---------|---------|--------|--------|
| 1970/71 | 11 | 188 | 66 | 1981/82 | 35 | 450 | 163 |
| 1972/73 | 29 | 240 | 64 | 1983/84 | 97 | 358 | 194 |
| 1975/76 | 20 | 301 | 110 | | | | |
| 1977/78 | 28 | 465 | 152 | Total | 495 | 5 149 | 1 839 |
| 1979/80 | 12 | 488 | 178 | | | | |

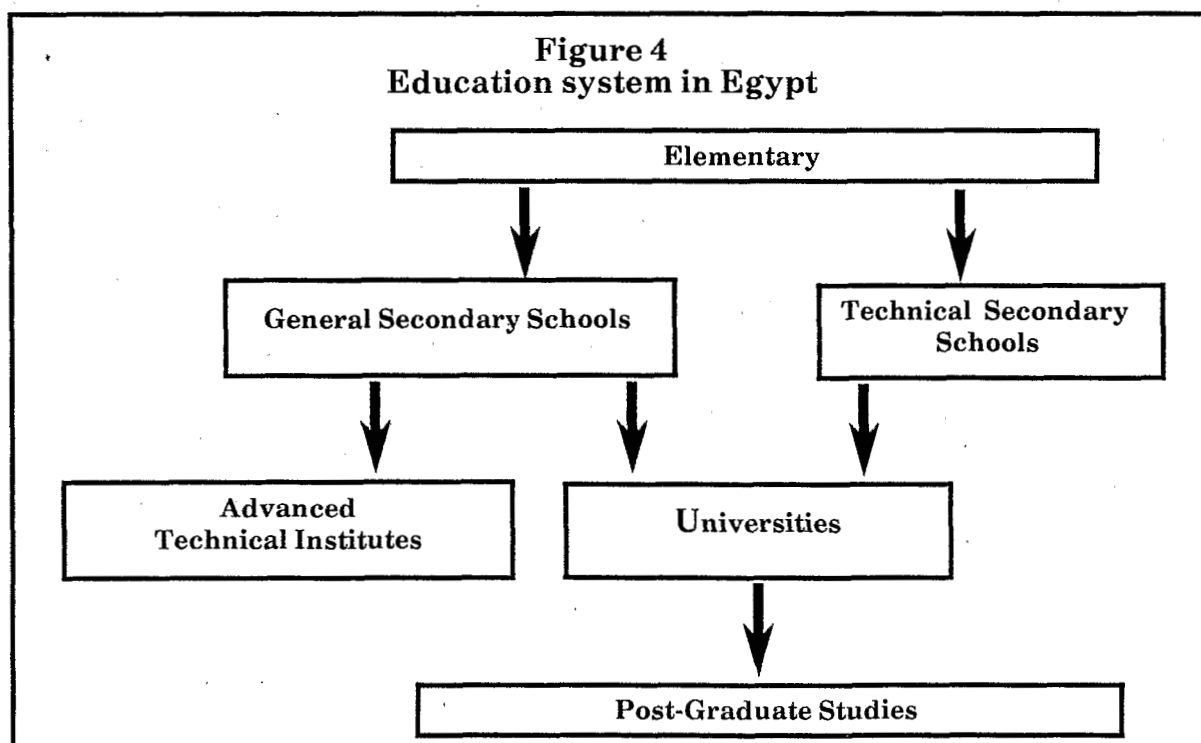
Table 1: Total number of students receiving higher degrees in agriculture from Egyptian universities since 1970/1971

| Field | M.Sc. | Ph. D. | Field | M.Sc. | Ph. D. |
|---------------------|-------|--------|---------------------|-------|--------|
| Agric. Botany | 13 | 9 | Agric. Microbiology | 11 | 7 |
| Agric. Economics | 27 | 12 | Plant Protection | 25 | 15 |
| Agric. Engineering | 10 | -- | Plant Physiology | - | 1 |
| Agric. Extension | 3 | 2 | | | |
| Agronomy | 36 | 25 | Plant Pathology | 16 | 6 |
| Animal Husbandry | 36 | 26 | Rural Sociology | 1 | - |
| Biochemistry | 9 | 5 | Poultry | 1 | 1 |
| Economic Entomology | 12 | 8 | | | |
| Cotton Sciences | 5 | 1 | Soil Sciences | 39 | 26 |
| Forestry | -- | 1 | | | |
| Food Technology | 54 | 20 | | | |
| Genetics | 8 | 4 | | | |
| Horticulture | 46 | 21 | | | |
| Home Economics | 1 | 1 | | | |
| Insecticides | 5 | 3 | | | |

Table 2: Total number of students receiving higher degrees in agriculture from Egyptian universities by field in 1983/1984

| Staff | Prof. | Assist. | Lecturer | Total | T. assist. | Total |
|----------------------------|------------|------------|------------|--------------|--------------|--------------|
| University/Faculty: | | | | | | |
| Al Azhar | 31 | 43 | 72 | 146 | 84 | 230 |
| Alexandria | 82 | 75 | 129 | 286 | 171 | 457 |
| Ain-Shams | 85 | 72 | 74 | 231 | 187 | 418 |
| Assiut | 48 | 22 | 38 | 108 | 100 | 208 |
| Cairo/Giza | 100 | 87 | 107 | 294 | 245 | 539 |
| Cairo/Fayoum | 3 | 8 | 35 | 46 | 78 | 124 |
| Helwan/Cotton. s.i. | 5 | 4 | 14 | 23 | 32 | 55 |
| Mansoura | 19 | 29 | 45 | 93 | 127 | 220 |
| Menia | 21 | 18 | 42 | 81 | 112 | 192 |
| Menoufia/Shebin El-Koum | 26 | 36 | 48 | 110 | 133 | 243 |
| Suez Canal | 5 | 10 | 20 | 35 | 59 | 94 |
| Tanta/kafr El-Sheikh | 33 | 31 | 47 | 111 | 152 | 263 |
| Zagazig/Zagazig | 44 | 34 | 57 | 135 | 145 | 280 |
| Zagazig/Moshtohor | 34 | 37 | 23 | 94 | 96 | 190 |
| Total | 536 | 506 | 751 | 1 793 | 1 721 | 3 514 |
| Facul. Vet. Medicine | 102 | 91 | 184 | 377 | 412 | 789 |
| Total | 638 | 597 | 935 | 2 170 | 2 133 | 4 303 |

Table 3: Number of staff members and teaching assistants in faculties of agriculture of Egyptian universities 1981/1982



Annex 2

Training as a Tool to Improve Water Management in Egypt

The irrigated agricultural lands of Egypt are located in the Nile Valley and Delta. The area of these lands amounts to six million feddans (1 feddan = 4 200 m²). The crop area is more than 12 million feddans due to crop rotation and cultivation more than once a year. Agriculture is the source of income of a vast percentage of the residents, moreover, the exported agricultural products, mainly cotton, rice, fruits, vegetables and flowers, form a principal part of our external trade.

The cultivated area depends on artificial irrigation by the Nile through an intricate network of water courses, starting by main canals fed from the Nile, then the various degrees of canals, until the farmers' private ditches.

Likewise, drainage water of agricultural lands goes through a similar network starting by the private ditches and ending by the main canals that empty into either the sea, northern lakes or interior lakes, by gravity or pumping, causing a rise in land fertility or at least preserving fertility levels.

The total length of these two networks, excluding the hundreds of thousands of kilometers of private ditches and drains, amounts to 50,000 kilometers, and includes hundreds of thousands of structures: High Aswan Dam, Old Aswan Dam, large dams on the Nile, regulators, locks, bridges, syphons, weirs, etc.

The Ministry of Irrigation (MOI) has the responsibility of operation and maintenance of these two huge networks, and all the related structures, keeping them in good working order; enabling precise water distribution in sufficient quantities and at proper times for various crops, procuring water necessary for hydroelectric generation, water for domestic use, navigation and industry. To ascertain these targets, MOI executes a national irrigation improvement program together with a structural replacement project. Simultaneously, MOI executes a national project to provide all irrigated lands with tile drainage. MOI also conducts an effective campaign to keep all water courses free from pollution.

To handle future increases in population, the MOI Projects Sector designs and executes a horizontal expansion project of

about 2.3 million feddans, besides procurement of the water they need.

The MOI Mechanical and Electrical Department is in charge of operation, maintenance and rehabilitation of all pumping stations, whether for irrigation or drainage, besides construction of new pumping stations needed.

The Shore Protection Authority undertakes protection construction to preserve the northern shores from erosion. The Survey Authority is responsible for all survey work throughout Egypt.

To guarantee implementation in a proper technical and economical way, the Water Research Centre (with its eleven research institutes), is in charge of doing studies and presenting solutions for problems that concern the various activities previously mentioned.

In order to carry out efficiently the current and anticipated MOI obligations and responsibilities, the Ministry certainly needs an adequate number of personnel suited to its purposes, composed of the proper levels and mix of a broad range of management, administrative, engineering and technical skills. Accordingly, the Training and Manpower Development Project (TMD) was established in June 1982 to provide a core of courses for engineers and technicians to improve and maintain the capability of MOI staff.

Training which has been conducted (through the TMD) in the MOI to improve water management, has been considered a successful experiment and is the study described in this paper.

Training to improve water management

As the Egyptian government operates and maintains the irrigation system up to the farm level, where the farmer is responsible for the distribution and the use of the water, management to increase the efficiency of water use is the main responsibility of the Ministry of Irrigation. Training for water

management started in 1978 at the Water Research Center of MOI as part of the Egypt Water Use Project (EWUP). In 1982, the Training and Manpower Development Project started to take over continuing education for the engineers and technicians of MOI. The emphasis was on operation training to upgrade the field engineers skill to meet the immediate operational requirements of irrigation projects. The training function has, over the years, enlarged its scope to include management, supervisory, and technical training as well.

The training programs are designed for MOI staff of different categories and levels ranging from technicians to top management staff. Training is conducted through a wide range of local programs and a limited foreign program. Four levels of personnel training may be identified, namely:

1. Farmers
2. Skilled workers and technicians
3. Engineers (field engineers, senior engineers, top management positions)
4. Clerical staff

To respond to both short and long term training needs, the training sections of the Water Research Center (WRC) organized and conducted for MOI about 25 courses attended by 376 engineers and 127 technicians. The average duration of each course was two to three weeks. A course on agricultural waterworks will last for seven weeks in Egypt and five weeks in the USA under a special agreement with the Salt Water Project in USA.

Outline of the training project

The Training and Manpower Development Project is one of the activities of the Water Research Center of the Ministry of Irrigation. The goal of the project is to train MOI personnel to increase their capabilities for the study, planning, design, execution and management of water projects.

An outline of the TMD project is shown in **Figure 1**. This basic structure is assisted by specialists from the different departments of MOI and Egyptian and foreign universities as needed for the different training programs that the project carries on.

Objective of the training project

The objective is to improve the productivity of a wide number of highly skilled specialists within the departments of MOI. The specific points to achieve this target are:

1. Develop a cadre of senior and middle managers with a comprehensive knowledge of how to plan, manage and direct the technical, financial, and manpower resources of the MOI.

2. Provide needed training to engineering personnel, in appropriate numbers, to ensure the needs of the MOI to achieve present and future targets.

3. Provide management and resources for continuing professional self-development of engineers and other professional staff.

4. Create training programs for sub-professional personnel to develop their range of practical skills.

5. Create a close and continuing link between the evaluation of MOI management and the needs for skills development and field operations.

Facilities provided to trainees for the training programs

The project boasts lecture rooms and conference halls that are very well equipped with audio-visual material and which enable two different courses to be held at the same time bringing together up to about 50 trainees.

Besides its own laboratories and experimental fields, the project benefits from similar facilities belonging to the 11 research institutes of the Water Research Center of MOI and local universities.

The project provides room and board to all participants in addition to all transportation and field trips organized during the courses.

Instructors and lecturers

Besides the full-time director, there are four instructors who work as course leaders; everyone organizes a course, supervises its implementation, and delivers some lectures.

Lecturers, who actually teach, are carefully chosen for their high capability, qualifications and experience. They are selected from senior MOI staff as well as Egyptian and foreign universities.

Local training

Local training is provided for engineers of different categories and technicians of MOI through training programs including different common and specific courses and seminars.

Training programs for engineers

The training programs for graduate engineers are divided in two categories:

1. Common courses that cover the area of design, construction, operation and maintenance, farm management, and planning

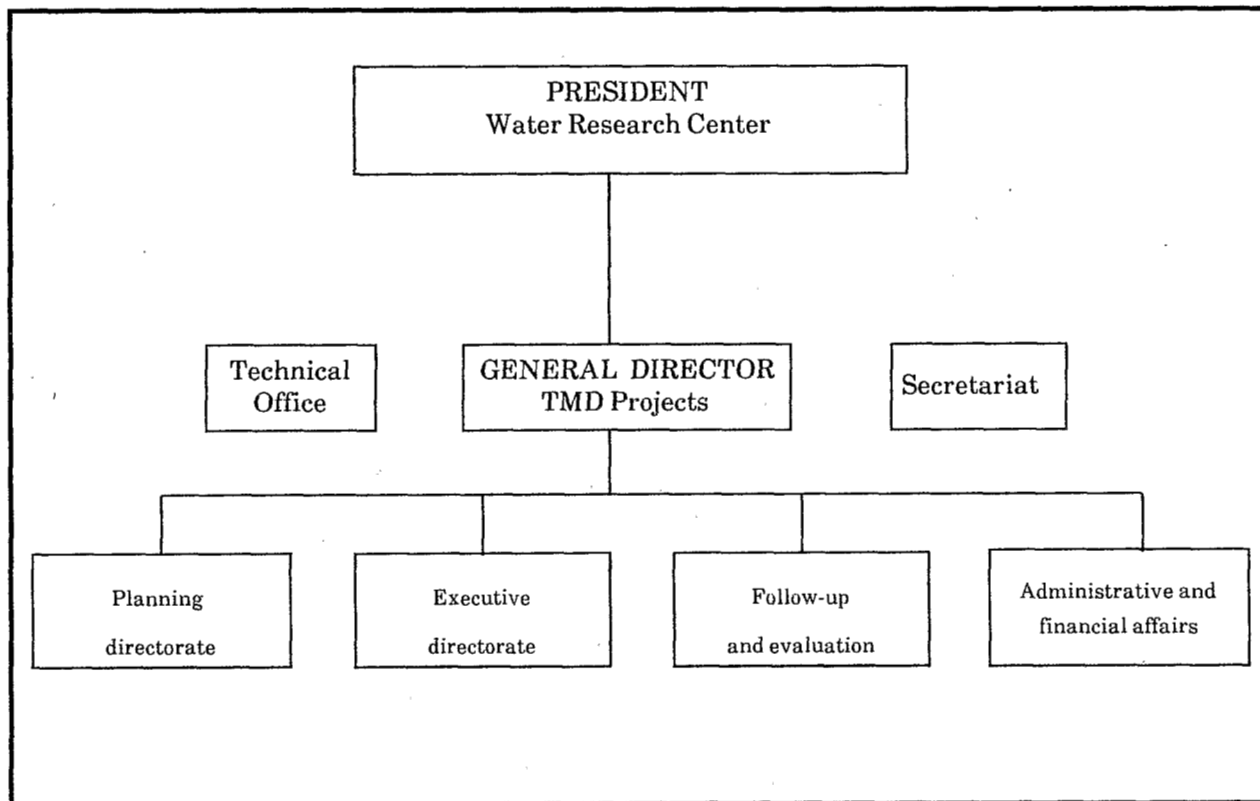


Figure 1: Outline of the training and manpower development project

and administration. These short courses are designed to fit different levels of engineers from the District Engineer to Senior Under Secretary of State. **Table 1** shows the title of common courses offered for engineers, number of trainees, and duration of each course.

| Common Course : number of courses : (1), number of trainees: (2), time duration days : (3) | (1) | (2) | (3) |
|---|-----------|-----------|------------|
| 1. Design of Irrigation Structures | 4 | 86 | 27 |
| 2. Construction Management and Quality control | 5 | 86 | 23 |
| 3. Operation and Maintenance | 4 | 73 | 12 |
| 4. On-Farm Water Management | 3 | 66 | 47 |
| 5. Planning and Administration | 4 | 78 | 12 |
| TOTAL | 20 | 12 | 389 |

Table 1: Summary of the common courses offered for engineers, January/December 1985

2. Specific courses which are designed to meet specific needs as experience dictates and according to the requirements of different departments of MOI such as: drainage, bridges, pipelines, shore protection, modern irrigation systems, etc.

Table 2 shows the titles of special courses offered for engineers, number of trainees, and duration of each course.

Training programs for technicians

Two training courses were held to cover subjects of top priority to MOI technicians. The courses given were in the fields of execution of irrigation works and water measurements and maintenance.

Table 3 gives the titles of courses, number of trainees and duration of each course.

Seminars

TMD pays special attention to holding seminars to discuss subjects of special importance to some MOI departments. Seminars are conducted by a specialist of the subject discussed and attended by those who are interested in the subject. The following are some examples of the seminars held as a part of the activities of the TMD project:

1. High Aswan Dam Environmental Impacts

- 2. Irrigation Systems and Hydraulics
- 3. Sediment Transport Offshore
- 4. Sediment Transport by Littoral Drift due to Waves
- 5. Sediment Budget of the Egyptian North Shore
- 6. Management Systems and Objectives.

| Course: number of courses (1), number of trainees (2), time duration days (3) | (1) | (2) | (3) |
|--|-----------|------------|-----|
| 1. Modern Irrigation Systems | 1 | 21 | 12 |
| 2. Inland Drainage and Soil Salinity Control | 2 | 45 | 19 |
| 3. Using Pipes in Irrigation Works | 1 | 20 | 12 |
| 4. Structural Replacement Projects | 1 | 15 | 12 |
| 5. Irrigation Improvement Projects | 2 | 39 | 12 |
| 6. 1985 Bridge Engineering | 1 | 38 | 19 |
| 7. Modern Equipment to Control Water Discharge and Levels | 1 | 9 | 12 |
| 8. Operation and Maintenance for Pumping Stations | 1 | 29 | 12 |
| TOTAL | 10 | 216 | |

Table 2: Summary of special courses offered for engineers, January 1982/December 1985

| Course: number of courses (1), number of trainees (2), time duration days (3) | (1) | (2) | (3) |
|--|-----------|------------|-----|
| 1. Execution of Irrigation Construction | 6 | 151 | 19 |
| 2. Water measurements and Maintenance | 5 | 104 | 19 |
| TOTAL of trained technicians | 11 | 285 | |

Table 3: Summary of courses offered for technicians, June 1982/December 1985

Foreign training

As some courses (particularly the specialized training courses) needed to be completed abroad, the project sent the trainees for a limited period to the U.S.A. for this purpose. Specific training programs were also arranged in Italy for some MOI trainees.

Table 4 shows the number of trainees and the periods of training during the years 1982 to 1985.

| Period of training | 82 | 83 | 84 | 85 | TOT |
|--------------------|-----------|-----------|-----------|-----------|------------|
| 4 weeks | 28 | 16 | 4 | | 48 |
| 5 weeks | | 27 | 31 | 40 | 98 |
| 8 weeks | 4 | 6 | 2 | | 12 |
| 13 weeks | 1 | | | | 1 |
| 29 weeks | 3 | | | | 3 |
| TOTAL | 36 | 49 | 37 | 40 | 162 |

Table 4: Number of trainees abroad

Characteristics and number of trainees

Trainees that have been trained by the project are of different categories and levels.

One of the categories is graduate engineers with university degrees, while another category is technicians with technical school education.

The different levels of the trainees were: the higher level which is meant by the Senior Under Secretary, Under Secretary; the supervisory level is considered as the Director General and Director while the executive level is the Assistant Director and District Engineers.

Table 5 shows the classification and characteristics of the engineers trained up to the end of 1985 and their numbers compared to the total number of MOI engineers.

It should be noted here that the total number of trained technicians up to the end of 1985 is 255 trainees.

Figure 2 presents the total accumulated number of engineers and technicians of MOI trained by the project since the start of activities in 1982 until the end of 1985.

| Total to end 1985 (1) Total Engineers of MOI (2) | (1) | (2) |
|---|-----|-----|
| Total number of trained engineers | 605 | |
| Male | 541 | |
| Female | 64 | |
| Specialization | | |
| Civil Engineer | 541 | |
| Mechanical Engineer | 21 | |
| Electrical Engineer | 11 | |
| Agricultural Engineer | 29 | |
| Geologist | 2 | |
| Chemist | 1 | |
| Official Level | | |
| Higher | 59 | |
| Supervising | 107 | |
| Exécutive | 439 | |

Table 5a: Some characteristics of the engineers trained

Evaluation

To evaluate the training courses and programs, two methods of evaluation were attempted: short term method and long term method.

The short term method of evaluation consisted of:

1. Pre-tests.
2. At the end of the course the trainees are required to give their own evaluation by filling in form No. (TR.1).
3. The instructor's evaluation is in the form of reports that show his personal evaluation of the awareness, communication and interest of the trainees during the courses.

The long term method is considered as a post-course evaluation, made one year after course completion. It consists of asking the trainee to fill in form No. (TR.2), and the trainee's supervisor to fill in form No. (TR.3). The chief of both gives his comments on both forms before submitting them to the Training and Manpower Development Project officials.

Future planning for training

Future development of a National Training Center:

In view of the increasing importance of training, the necessity of introducing it to all branches of MOI, and reiterating it to the

| Total to end 1985 (1) Total Engineers of MOI (2) | (1) | (2) |
|---|------|------|
| Department | | |
| Dept. working for irrigation dept. | | |
| Irrigation | 237) | |
| Projets | 141) | |
| Dams | 10) | 1498 |
| Design | 16) | |
| Drainage | 102 | 488 |
| Research | 61 | 348 |
| High Dam | 1 | 34 |
| Shore protection | 2 | 29 |
| Mechanical & Electrical | 32 | 783 |
| Planning and follow-up | 2 | 20 |
| River Nile | 1 | 40 |
| Geographical spot | | |
| Cairo | 124 | |
| Western Delta | 43 | |
| Middle Delta | 109 | |
| Eastern Delta | 130 | |
| Middle Egypt | 80 | |
| Upper Egypt | 118 | |

Table 5b: Some characteristics of the engineers trained

same individual over a limited period, MOI decided to establish a "National Training Center" because the existing training programs cover only some branches. It is designed to fulfil the following mandate:

1. Consolidate under one management all MOI training activities.
2. Provide a higher volume of training for all branches, which ensures that the necessary critical mass of highly trained professionals are developed to ensure that MOI can meet its development objectives.
3. Improve the performance of instructors and trainers in order to attract higher qualified staff and result in higher quality instruction.
4. Promote and facilitate coordination of training programs and thus reduce any probable duplication or overlapping.
5. Training under one management enables more accurate and continuous assessment of training needs which provides economy and savings in administrative costs.

6. Enable improved coordination with training units in other ministries.

7. Facilitate and improve coordination with foreign training units and thus enhance the possibilities of exchanging trainees and donor funding.

8. This center may share in training engineers and technicians from the Middle East, Africa and some Asian countries, that can benefit from the broad range of training programs that it offers.

Results

As a result of the TMD project, the following has been attained:

Results from the Short Term Evaluation:

1. With the results of the pre-tests, which cover all subjects of the training program, the course instructor makes course improvements, e.g., he commits the lecturers to modify the contents by giving more attention to the subjects that the results show that the majority of trainees do not do well in.

2. Initially, courses for technicians were two weeks long. The trainee course evaluation clearly indicated their need to extend the courses to three weeks, which is now being done.

Results from the Long Term Evaluation:

1. The initial results of post-course evaluations, besides the reports from the field supervision, indicated that trainees,

whether engineers or technicians, are remarkably better in specific job performances than their non-trained counterparts.

2. Results also indicated that a noticeable majority of trainees gained more knowledge and skills that lead them to higher job performance and better human relationships.

This was reflected, for example, on better water distribution, naturally followed by less complaints of water users, and more savings in precious irrigation water. Also, construction and maintenance work increased in quality.

Conclusions

It is concluded from the preceding results that the training has proved that the following can be achieved:

- better water distribution,
- more savings in irrigation water,
- higher quality of execution of irrigation works,
- more perfection in operation and maintenance of water distribution works.

As a result of the success of the TMD project and the various benefits gained from the experiment, the idea of establishing a National Training Center arose. This idea is mainly based on the results of the TMD project.

The final conclusion is:

"Irrigation water management in Egypt has been improved through training".

Figure 2
 Numbers of engineers and technicians trained
 from 1982 -1985

