

creative associates, inc.

**TECHNOLOGY  
TRANSFER BY  
PARTICIPANT  
TRAINING:  
TUNISIA**

An Evaluation of ATT  
Project (664-0304) and  
TT Project (664-0315)

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FOR USAID/TUNIS**

**JANUARY 1986**

**CONTRACT # NEB 0150-C-00-5200-00**

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## ABBREVIATIONS USED IN THE REPORT

AED	Academy for Educational Development
AID	Agency for International Development
ATT	Agriculture Technology Transfer Project (664-0304)
Bac	Baccalauréat (Secondary School/University Entrance Examination)
CES	Conservation des Eaux et du Sol (Soil and Water Conservation)
CNEI	Centre National des Etudes Industriels (National Center for Industrial Studies)
CRGR	Centre de Recherche du Génie Rural (Research Center for Rural Engineering)
DERV	Direction de l'Enseignement, de la Recherche et de la Vulgarisation (Directorate of Education, Research, and Extension)
DRA	Diplôme de Recherche Approfondie
EFL	English as a Foreign Language
ELI	English Language Institute
ENIG	Ecole Nationale d'Ingénieur à Gabès (National Engineering School at Gabes)
ENIS	Ecole Nationale d'Ingénieur à Sfax (National Engineering School at Sfax)
ENMV	Ecole Nationale de Médecine Vétérinaire (National School of Veterinary Medicine)
ENSET	Ecole Nationale Supérieure d'Enseignement Technique (National College for Technical Education)
ENSI	Ecole Nationale des Sciences de l'Informatique (National School for Computer Science)
ESAK	Ecole Supérieure d'Agriculture du Kef (Agricultural College at Kef)
ESEM	Ecole Supérieure d'Elevage-Mateur (Livestock Production College at Mateur)
ESEPR	Ecole Supérieure d'Economie et de Promotion Rurale de Moghrane (College of Economics and Rural Development at Moghrane)
ESH-CM	Ecole Supérieure d'Horticulture-Chott Meriem (Horticultural College at Chott Meriem)
ESIA	Ecole Supérieure des Industries Alimentaires (Food Technology College)
ESIER	Ecole Supérieure des Ingénieurs et de l'Équipement Rural (College of Agricultural Engineering)

FSA Foreign Student Advisor  
 FSM Faculté des Sciences à Monastir (Science Faculty at Monastir)  
 FSTM Faculté des Science et Techniques à Monastir (Faculty of Science and  
 Technology at Monastir)  
 GOT Government of Tunisia  
 IBLV Institut Bourguiba des Langues Vivantes (Bourguiba Language Institute)  
 IELP Intensive English Language Program  
 INAT Institut National Agronomique de Tunisie (National Agricultural  
 Institute of Tunisia)  
 INRAT Institut National de la Recherche Agronomique de Tunisie (National  
 Agricultural Research Institute of Tunisia)  
 INRF Institut National de la Recherche Forestière (National Institute for  
 Forestry Research)  
 IRA Institut des Régions Arides (Arid Lands Institute)  
 ISG Institut Supérieur de Gestion (Management Institute)  
 ITAA Institut Technique d'Architecture et d'Urbanisme (Technical Institute  
 of Architecture and City Planning)  
 MHERS Ministère des Hautes Etudes et de la Recherche Scientifique (Ministry  
 for Higher Education and Scientific Research)  
 MIAC MidAmerica International Agricultural Consortium  
 MIS Management Information System  
 MOA Ministry of Agriculture  
 MUST Mission Universitaire et Scientifique de Tunisie (Tunisian Scientific  
 and University Mission)  
 OEP Office de l'Elevage et des Pâturages (Office of Livestock and Pastures)  
 PC Peace Corps  
 PCV Peace Corps Volunteer  
 TEFL Teaching English as a Foreign Language  
 TESOL Teaching of English to Speakers of Other Languages  
 TESP Teaching English for Specific Purposes  
 TOEFL Testing of English as a Foreign Language  
 TT Technology Transfer Project (664-0315)  
 USIA United States Information Agency  
 USIS United States Information Service

## EXECUTIVE SUMMARY (EVALUATION OF 664-0304 AND 664-0315)

### RESUME

The Agriculture Technology Transfer Project (664-0304) began in 1979 (Grant Agreement). The Technology Transfer Project (664-0315) began in 1981 (Grant Agreement). Both projects are now operating with their fourth Amendments. Both projects have focused on participant training in the United States: graduate study in management (TT) and agricultural sciences (ATT) as well as undergraduate and graduate study in engineering (TT). Both projects require, therefore, that students master English. The current agreements will bring the cumulative numbers of students trained to roughly 90 (ATT) and 500 (TT).

These projects, via successive amendments, also have sought to foster linkages--researcher to researcher, professor to professor, and institution to institution--between Tunisia and the United States. Beginnings have been made with short-term visitations, collaborative research projects, and faculty sabbatical exchanges between Tunisia and the United States. The development of linkages of institutions is only in an exploratory stage. These efforts already have had worthwhile effects on teaching styles, curriculum content, and degree equivalency in Tunisia.

These projects complement a substantial program in institution building by the Government of Tunisia (GOT). New schools of agriculture, engineering, and technology have been started in recent years as constituent parts of the country's only university, the University of Tunis. These projects also contribute to indigenous efforts to reduce cultural and other dependency on France. Tunisians aim, as they express it, to achieve "real independence."

### METHODOLOGY

The evaluation team reviewed documents in French and English, in Tunisia and the United States. Site visits were made to agricultural, engineering, and language schools in Tunisia. Graduate students and former students were interviewed as availability permitted in Tunisia and the United States. A random sample of engineering undergraduates was interviewed by telephone in the United States. The team also interviewed professors, deans, directors, and officials of participating institutions (both governments and several universities). Both contractors were interviewed in the United States: MidAmerica International Agricultural Consortium (ATT) and the Academy for Educational Development (TT).

### FINDINGS

Both projects are subjectively desired and objectively appropriate in Tunisia. Project snags and delays have been within an acceptable range and have been handled in a straightforward manner. These projects are efficient and effective, therefore, in the collective judgment of the evaluation team.

Both projects, as scholarship programs, are outstanding successes. Participating students are carefully selected. The nationwide competition for undergraduate engineering scholarships has emerged as the functional equivalent of the National Merit Scholarships in the United States. The best and the brightest aspire to be selected for this undergraduate program in the United States. The graduate students are selected with comparable rigor on the basis of nationwide competition or grade point averages (in the case of undergraduate engineers in the United States).

The scholarship students actually complete their degree programs. Tunisian officials claim the drop-out rate is higher for their students in France. The drop-out rate is considerably less than ten percent in any case, in the United States. Grade point averages are quite high for undergraduate participants. American professors express a high regard for students in both programs. English instructors, in particular, express some astonishment at the speed the students "get up on" English.

English language training is clearly adequate, as shown by the students' success at universities in the United States. Graduate students are responsible themselves for acquiring a passable mastery of English in Tunisia. A four to five week program is required for undergraduate students, after preliminary selection and before departure, in Intensive English. All (graduate and undergraduate) students, with few exceptions, follow through with Intensive English in the United States. The few exceptions have high scores on the TOEFL Test. These exceptions are significant inasmuch as their grade point averages are lower on average than the grade point averages of the other students. Intensive English in the United States is important for every student not only for language fluency but also for cultural adjustment.

These projects as linkage programs (as distinct from scholarship programs) are still exploratory. The short-term visitations, faculty exchange sabbaticals, and collaborative research projects are useful beginnings. These preliminary overtures are worthwhile themselves, but follow-up is needed for broad and sustained linkages. The evaluation team has considered a number of possibilities. Tunisian professors, for example, might teach in summer sessions at selected universities in the United States. Summer teaching has the advantage that the basic cost (salary) is a routine expense for universities in the United States. (And many universities seek outside faculty for summer sessions.) Such expedients are desirable, but outside funding is required for sustained institution to institution linkages.

#### RECOMMENDATIONS

The evaluation team recommends the following, inter alia, to GOT and USAID.

English Language Training. Do not try to do it all in Tunisia. Do retain the present model of a four- to five-week program of Intensive English in Tunisia followed by Intensive English as needed in the United States. USAID probably should continue to fund the four- to five-week program of Intensive English in Tunisia.

Tunisia-United States Linkages. Continue current types of person-to-person linkage activities: short-term visitations, faculty sabbatical

exchanges, collaborative research projects. There should be, as a matter of course, a decline in visitations by governmental officials. Broaden activities to include, for example, a program of seminars/lectures by recognized authorities as well as summer teaching by Tunisian professors in the United States. To maximize institutional awareness/commitment, focus the development of institutional (school-to-school) linkage efforts on a few universities that have been responsive to USAID programming in Tunisia--for example, the University of Minnesota, Ohio State University, Michigan State University, the University of Missouri, and University of Wisconsin-Madison.

Tunisian councils of engineering deans and agricultural deans should be established to draft desiderata for institutional linkages. The Tunisian Scientific and University Mission in the United States, rather than a contractor, should have the lead role in negotiations with universities in the United States.

Sustained linkages of academic institutions are not likely to endure without outside funding.

Manpower Planning. Continue these projects. Skilled manpower is in short supply. Ph.D.s, in particular, in science and technology will be needed for many years, until institution building is further along in Tunisia.

Short-term training of returned (and other) degree holders is important to update skills in particular fields and to compensate for shortfalls in particular fields by (re)training specialists in kindred fields.

Rationalize the salary scales for scientific researchers and faculty members. These need to be roughly comparable.

## 1. INTRODUCTION

This report is an evaluation of the Technology Transfer (664-0315) and Agriculture Technology Transfer (664-0304) Projects. Both projects focus on participant training in the United States: graduate study in management (TT) and agricultural sciences (ATT) as well as undergraduate and graduate study in engineering (TT). Such projects presume the students' capacity to follow instruction in English. This evaluation, accordingly, considers not only the projects but also the ancillary programs in Intensive English.

These projects complement a major program of institution building by the Government of Tunisia (GOT). The University of Tunis, the primary supplier of skilled manpower, has grown rapidly in recent decades. Nevertheless, a short supply of skilled manpower in scientific fields is forecast for several years. These projects are intended to meet that shortfall (in part). This evaluation, accordingly, considers the projects in the broad context of manpower planning and university growth.

The projects are designed to increase the flow of technology to (as well as the pool of skilled manpower in) Tunisia. This entails the cultivation of linkages with centers of science and technology in the United States. Such linkages are more advanced with ATT than with TT. (ATT antedates TT). This evaluation considers the linkage prospects for both projects in the long run.

The evaluation team reviewed documents in French and English, in Tunisia and the United States. Site visits were made to agricultural, engineering, and language schools in Tunisia. Graduate students and former students were interviewed as availability permitted in Tunisia and the United States. A random sample of engineering undergraduates was interviewed by telephone in the United States. The team also interviewed professors, deans, directors, and officials of participating institutions (both governments and several universities). Both contractors were interviewed in the United States: MidAmerica International Agricultural Consortium (ATT) and the Academy for Educational Development (TT).

## 2. MANPOWER PLANNING

### 2.1. BACKGROUND

Manpower planning is the responsibility of the Directorate of Manpower Planning of the Ministry of Planning. It carries out its mission through data supplied by line ministries. Manpower statistics are published periodically.

For the Ministry of Higher Education and Scientific Research (MHESR), the ministry link with the Ministry of Planning is the Office of Planning, Statistics and Data Processing. This office has the major responsibility for determining demand by academic fields for higher education. Based on manpower requests from each ministry, it serves as the starting point for planning for faculty and facilities required to meet the demand for training on a short-term basis.

For long-term manpower planning, the Human Resources Planning Commission has been organized in the MHESR. It is composed of:

- several key MHESR officials,
- representatives of the higher academic institutions,
- a representative of the Ministry of National Economy,
- a representative of the Ministry of Planning,
- representatives of other offices, centers, and institutes.

This interagency commission has been charged (1) to prepare a preliminary assessment of the country's needs for scientists and engineers, (2) to conduct a comprehensive manpower planning program for the long range, and (3) to develop a capability to forecast manpower requirements for the national economy.

The preliminary study is designed to assist the Ministry in making decisions relevant to Tunisian students being sent abroad for studies in a variety of disciplines. Future Tunisian manpower needs in technology are intimately linked to the ability of Tunisian educational institutions to supply such needs.

### 2.2. THE AED REPORT

An American manpower planning expert has completed a study to project technical manpower requirements in Tunisia and submitted a report, under the auspices of AED. It states that most currently employed engineers do not appear to be misallocated by major disciplines. However, the report projects that, by 1993, 50 percent of all Tunisian engineers will be employed in manufacturing. Almost 7,000 new engineers will need to be trained by 1993 spanning a much greater diversity of specialized fields.

### 2.3. PRELIMINARY MANPOWER ASSESSMENT

A study to assess preliminary manpower requirements was conducted by Dr. S. Zouari of the Institut des Hautes Etudes Commerciales under the auspices of MHESR. The study attempted to evaluate the economic need of the technical sector, predict the supply of university personnel and high technicians, and provide direction for solutions based on needs of the economy and the supply coming from the educational systems. The study utilized statistics generated by various sources, including the National Centre for Industrial Studies (CNEI).

The report was issued as "Formation des Ingénieurs et Techniciens Supérieurs pour la Décennie '82-'92," in December 1983. It predicted a major shortage of engineers and technicians by the end of the decade of 1982-1992.

This report is a worthy and serious study, but its accuracy in detail is doubtful. Tunisians, privately in interviews, endorsed the general need for more engineers, "who are not desk-bound," but expressed reservations about the official statistics in manpower planning. "I don't take such figures seriously," according to one Tunisian. The evaluation team was unable to appraise such criticisms because (1) time was short and (2) documents and interviews were not made available as requested. However, in general, official statistics for manpower planning are apparently advanced as both forecasts and governmental targets in Tunisia. We note that, in many countries, the published figures fall between the real forecast and the real target and, consequently, are neither the real forecast nor the real target. For a critical comment on this shortcoming of official figures in Britain, see The Economist, 18-24 January, 1986, p. 46.

### 2.4. MEETING HELD WITH THE HUMAN RESOURCES PLANNING COMMISSION

On November 10, 1985, the team met with several members of the Human Resources Planning Commission. Discussion revealed that attempts are being made to assess market needs as well as technical needs as part of the process of manpower planning. The Commission will be involved in planning for both secondary and higher education. They plan to arrive at a model to show how the educational output fits into manpower needs.

GOT has assigned a high priority to human resource development, particularly in science and technology. The number of baccalaureat graduates going to the university has been increasing at a rapid rate. However, there are not enough graduates in the technological disciplines to meet national demands. A major problem is the lack of teachers. This applies to secondary education as well as the university system.

It was estimated that Tunisia educates per year 100 principal engineers (6 years of university training), 260 engineers (4 years), and 520 high technicians (2 years). Thus, the engineering output from Tunisian schools is approximately 350 per year, but the need is said to be closer to 1,000 per year. The difference is being supplied (in part) by overseas training.

## 2.5. COMMENTS ON PROJECTING MANPOWER NEEDS

The projection of manpower needs through 1992 has progressed very slowly. A very special effort appears necessary to accomplish the mission. It is too early to judge whether the Human Resources Planning Commission can be a successful vehicle to arrive at realistic projections. Its membership is around 20, which appears to be much too large to be effective as a working group.

Manpower planning is a very serious activity. It should not be allowed to become ineffective by default. The growth performance of the industrial sector will be increasingly dependent upon the quality and quantity of highly trained and technically capable individuals. According to World Bank reports on the Tunisian industrial competitive advantage, the country has extremely strong potential for export of a wide variety of engineering and electronics machinery, construction material, processed foods, fertilizers and chemicals, plastics, wood and paper products, leather goods, basic textiles and clothing.

The AED study of manpower has tabulated a diversity of fields that may experience shortages in the years to come. The relative demand for various fields is shown below in percentages for 1983 and 1983-1993.

### COMPARATIVE DATA ON REQUIREMENTS

<u>Field of Engineering</u>	<u>1983 Percentage</u>	<u>1983-1993 Percentage</u>
Civil	24.5	17.3
Mechanical	17.8	21.3
Electrical	11.9	14.2
Chemical	10.0	12.0
Metallurgical	1.9	3.3
Industrial	4.3	6.1
Agro-Industrial	3.9	5.7
Mining and Geological	6.2	3.8
Petroleum	3.2	2.5
Aero, Pilots, Meteorological	3.3	3.4
Maritime	0.8	0.7
Agricultural	3.3	1.7
Computer related	5.1	6.1
Telecommunications	3.8	1.9

There are specific fields that should be planned for in terms of available and projected manpower. For example, demand for civil engineers should decrease with time while the need for electrical engineers should increase.

## 2.6. PLACEMENT OF RETURNING SCHOLARSHIP STUDENTS

An important component of manpower planning is the placement of returning scholarship students. Ideally, these students should be placed in fields for which the Tunisian economy is in a deficit manpower position.

A re-entry program has been considered but not yet implemented for returning graduates in management/engineering. TT graduated its first undergraduate students (about 15) in June 1985. Some are now going on to graduate studies in the United States. Eleven have returned to Tunisia. The returning graduates will need increasing assistance in job placement as their numbers grow.

Tunisian students upon returning are required to file for the Diploma Equivalency Evaluation. This procedure is intended to be routine for B.S., M.S. (if 2 years + thesis), and Ph.D. degrees earned in the United States. But delays can and do occur to the frustration of the students. The Commission of Equivalency handles all requests for "Equivalency of Degree" earned in other countries. This is a taxing activity considering all the scholarship students assigned abroad. The process takes four to eight weeks, much closer to eight weeks.

### Recommendation

The development of a re-entry program should be given high priority during 1985-86. By June 1986, the program should be well defined. GOT should develop a mechanism for welcoming these students upon their return, counseling on the availability of positions, assisting in filing for Diploma Equivalency, and providing the opportunity to describe their experience (perhaps at the next Intensive English program). This type of program can only enhance the morale of the students. It should be developed by MHESR in cooperation with MUST.

## 2.7. INTER-AGENCY COORDINATION OF MANPOWER NEEDS

MHESR's Human Resources Planning Commission is supposed to generate interest in interministerial and other institutional coordination to plan for manpower needs. But about half the technical manpower training is under MOA. There seems to be little interministerial coordination in actual practice.

There is reason to believe that the engineering schools have developed some plans to project their needs. This point seems to be addressed whenever discussions allude to it. However, if such documents exist, they have not been widely distributed.

## Recommendation

An organization chart should be produced to show interministerial and other institutional relationships for manpower projections, plus a list of studies/projections used as policy guides by GOT.

### 2.8. CONTINUING PROFESSIONAL DEVELOPMENT OF ENGINEERING FACULTY

The rate of change of engineering knowledge and practice, and of the underlying theoretical base, is accelerating at an astounding pace. Biotechnology has become a part of chemical engineering; the computer is a prominent part of electrical engineering; aeronautical engineers are in space and are learning to use composites and adhesives in place of aluminium and rivets; metallurgy has embraced materials science with a concern for fundamental properties and the fabrication of everything from steel to semiconductor materials to high strength ceramics; mechanical engineers design robots and high performance gas turbines; the list goes on throughout the engineering disciplines.

In this rapidly changing, technology-dependent world, engineering schools are charged with educating students to cope successfully not only with the problems of today, but also with those of tomorrow. This places a special burden on the members of the faculty of the engineering schools. They must be at the cutting edge of their specialties and must stay up-to-date as new progress is made. They must also be able to move into new fields when their specialties become obsolete (or less relevant). Thus, the task of keeping up-to-date is significantly more difficult than ever before.

Keeping up-to-date is the mission of continuing professional development. Through professional development, faculty members improve their ability to fulfill their responsibilities and to ensure a supply of competent new engineering graduates for the needs of the nation.

The principal faculty development program generally available and frequently used by individual professors is the sabbatical leave. In addition, there are many other significant development activities available to the faculty, such as

- leaves
- completion of other degrees
- writings: journals, books, manuals
- research: sponsored or personal
- course design and development
- attendance at professional meetings, seminars, short courses
- industrial/summer employment

- consulting
- professional matters (editing journals, membership on technical committees, advisory boards)

If continuing professional development is to be regarded as a regular part of the job of each faculty member--as it should be--then the engineering schools must provide the financial support for that part of the job as they do for the more traditional responsibilities of teaching and research development.

#### Recommendation

Directors of engineering schools must take the lead in developing and implementing a program under which continuing professional development is a regular part of the job of each member of the faculty. This includes developing the budgetary resources to support such a program.

### 2.9. CONTINUING PROFESSIONAL DEVELOPMENT OF PRACTICING ENGINEERS

Points raised in Section 2.8 apply equally well to practicing engineers. They need to be provided with continuing professional development in order to remain current in their fields of expertise or to switch laterally to other fields of expertise.

Continuing education for professional development takes many forms, such as:

- part-time evening programs leading to advanced degrees
- research seminars in specific disciplines
- non-credit short courses, seminars, and workshops to introduce new advanced technology concepts
- satellite instructional television courses between the university community and industry

#### Recommendation

Consideration should be given to providing practicing engineers and technical managers with part-time educational opportunities to remain up-to-date and to be introduced to emerging technologies through continuing education.

### 2.10. WORLD CONGRESS ON CONTINUING EDUCATION

The World Congress on Continuing Education is an international conference on professional development that meets periodically in different parts of the world. Last year, the Congress met in Mexico. In 1988, it is planning to meet in Portland, Oregon.

The World Congress is a source of ideas and information; it attracts engineering educators from all over the world and is the only international conference that focuses on all aspects of continuing education, particularly the obsolescence of mid-career engineers and the use of educational technology.

Educational technology plays a significant role in a variety of delivery modes particularly suitable for continuing education. These delivery modes are highlighted at the World Congress based upon up-to-date experiences that may be helpful to others in planning their programs.

It would seem wise to hold one of the World Congress meetings in Tunis. It is a convenient location. The Congress is held usually during the latter part of June. Many attendees use the occasion as part of their vacation. Tunis has much to offer both as a conference and vacation site. The Congress is self-supported through a registration fee.

#### Recommendation

Explore the possibility of holding the World Congress on Continuing Education in Tunis the next time around.

Further details can be obtained by writing to Dr. Joseph Biedenbach, Director of Continuing Education, Division of Engineering, University of South Carolina, Columbia, South Carolina. The director of an engineering school, probably, should handle this correspondence. Dr. Biedenbach is a personal friend of Dr. Anthony B. Giordano, a member of the evaluation team.

#### 2.11. MANPOWER PLANNING: DEVELOPING ENGINEERING LEADERSHIP

Engineering in contemporary society could be defined as practicing the art of shaping technological change. In a society in which science and engineering are both pursued vigorously, this definition implies a turbulent changing scene. In the words "practicing the art," it recognizes the need of coupling technology with human factors. The word "shaping" is indicative that leadership in engineering involves the capacity for breaking through into new domains, rather than merely extending present ones.

When a creative engineer designs for the future, he must often work as a scientist. Also, to achieve some of the great advances in science, many scientists have worked as engineers. Designing for the future calls for a keen insight into man's need, a profound appreciation of modern science, a vision of the future, and a desire to achieve it.

We have before us, therefore, a multiple task. First, to equip engineers with the most up-to-date and profound understanding of the total body of science, second, to equip them for learning anew as society moves forward, and third, to convey to them some of the art of making the complicated decisions involved in bending the forces of science to the design and building of the multitude of needed new applications and sophisticated machines, whose very nature is unknown while they are being educated. Finally, we must develop their capacity to make their contributions work as civilizing influences in society.

Specifically, the challenge of today is to integrate the areas of physical science, life science, engineering science, social science, and the humanities in ways that provide a core of knowledge that does not now exist. The main focus should be on learning, on generating new ideas, new philosophies, new doctrines that meet the need of the future as well as the present.

Recommendation

The (recommended) council of engineering deans should hold discussions to consider the elements of engineering education that lead to the development of engineering leaders in Tunisia.

### 3. THE SCHOLARSHIP PROGRAMS

#### 3.1. PROGRAM SUCCESS

ATT and TT are conspicuously successful as scholarship programs for university study in the United States. Notable indicators of success include:

- (a) the high grade point averages of the undergraduate engineering students, by fall 1985, 80 percent had grade point averages of better than 3.0 (of those students who were in the system long enough to have a grade point average, at universities with a 4-point scale);
- (b) the high percentage of degree completion by graduate students in agricultural science, by fall 1985, only 4 of 73 had failed, for nonacademic reasons, to complete degrees;
- (c) MHESR officials say the drop-out rate is higher in France than in the United States for undergraduate engineering students from Tunisia; this indicates inter alia careful selection of student participants and adequate training in English (see Section 4 for details on English);
- (d) the high rate of return to Tunisia upon degree completion, there has been, thus far, no "brain drain" from either project.

The projects in general are efficient and effective. Both projects are objectively appropriate and subjectively desired in Tunisia. This section, accordingly, focuses on problems of detail and recommendations for the future.

#### 3.2. DEGREE TRAINING (ATT)

3.2.1. The original objective of the project was to train 79 Tunisians to the M.S. or Ph.D. level to fill specified positions in 11 different institutions in the Ministry of Agriculture. Early in the project the number of beneficiary institutions was increased to 16, and instead of 79 persons the objective was changed to a total of 79 degrees. The number who have or will have received graduate level degrees is 69, assuming those still in the United States are successful. Of that number 43 have completed their programs and have returned to Tunisia. Two have completed degree requirements but are still in the United States. The remaining 24 are expected to complete their degree studies by August 31, 1986.

3.2.2. Long-term participants are listed in Annex 11, including their fields of specialization, degree obtained or to be obtained, their university location, and actual assignment of those who have returned. Nineteen Land Grant Universities participated in the training, including the five in MIAC. (See Annex 6.)

Not shown in the table are four students who commenced graduate study but soon terminated their programs--one died and three withdrew for reasons not related to academic performance.

3.2.3. Three of the 43 who have returned are working outside the Ministry of Agriculture. One, a drainage engineer, is working on the "Lac de Tunis" project; one is assigned to the "Ecole de Gestion" in Sfax, the other, a Ph.D. in statistics, is working in Saudi Arabia.

3.2.4. USAID program documents, to avoid confusion, should distinguish clearly between the number of degrees obtained and the number of persons trained. Some persons obtain more than one degree, so the numbers are not identical.

3.2.5. The evidence observed during the evaluation supports the view that the graduate degree training (M.S. and Ph.D.) has been a marked success. Positive impacts are highly visible particularly in the agricultural schools. Graduates from the project are teaching the majority of the higher-level courses at the National Agricultural Institute, the Superior School of Agriculture in Kef, the Farm Machinery School at Medjez el Bab, and the Livestock School at Mateur. They also teach advanced courses in the Horticultural School at Chott Meriem. In addition to teaching, the returned agricultural specialists are engaged in or have plans for applied research at their institutions on problems of importance to Tunisia. One Ph.D. at INAT also teaches a course in hydrodynamics in an engineering school of the University of Tunis. Twenty of the returned graduates are teaching in the above institutions and more are expected to engage in teaching in the future.

3.2.6. Degree recognition and equivalence is no longer a problem for those with M.S. and Ph.D. degrees in agricultural sciences from Land Grant Universities in the United States. The Ph.D. is equated with the "Doctorat d'Etat" and the M.S. with "Doctorat de Troisième Cycle."

3.2.7. The Director of INAT identified the following favorable impacts or benefits that the American-trained professors have brought to his institution.

1. The new U.S.-trained professors have introduced effective pedagogic concepts and methods of teaching including:
  - more extensive use of the library and reference materials as sources of supplementary knowledge (this develops a healthy questioning attitude on the part of the student);
  - use of audiovisual equipment;
  - relating theory taught in the classroom to the solution of specific problems adversely affecting Tunisian agriculture;
  - computer use in the classroom.
2. The professors generate a continuing flow of up-to-date scientific information in their particular disciplines through linkage relationships and their ability to read scientific journal articles in English (the language of the vast majority of the western world's agricultural research publications).

3. Thanks to the ATT Project, his institution has passed from one simply undergoing evolution to actual "revolution" in the learning and research processes.
4. In the foreseeable future it should be possible to offer sound Ph.D.-level training programs, just as M.S.-level training in selected disciplines began less than 10 years ago.

3.2.8. INRAT, which in the initial project plan was to have sixteen graduate degree professionals added to its staff, actually has only seven of the nine originally affiliated with INRAT. Thus it has not received its planned share of the American-trained agricultural scientists despite the need to strengthen its staffs in the Central laboratories in Tunis and some twenty outlying experimental farms.

3.2.9. Professional agricultural research personnel, particularly those with Ph.D. degrees, prefer to be assigned to a teaching institution rather than INRAT because the difference in pay scales for equivalent competence favors the agricultural schools. This has long been a major obstacle to strengthening INRAT's research capability by adding Ph.D.-level graduates. Until this discrepancy in salaries and allowances is resolved, the research institution will continue to lag behind in the development of needed high-level manpower and in the output of useful agricultural research.

#### Recommendation

3.2.10. If the problem of inequitable remuneration of Ph.D. research scientists is solved in the near future, it is suggested that consideration be given to providing INRAT with additional M.S.- or Ph.D.-level graduates.

3.2.11. The inclusion in the agricultural schools of applied research activities on problems of national and/or regional interest, in support of teaching, is an excellent formula and should be supported. The evaluation team, in view of the shortness of time and its scope of work, made no effort to evaluate research activities. We did get the impression that research being done in the schools is properly focused on real problems of interest to Tunisian agriculture, and that students participate in a "hands-on" fashion in some of the research activities.

### 3.3. SHORT-TERM TRAINING (ATT)

3.3.1. Short-term training for specific purposes was limited to 15 participants (Annex 7). The short-term visitations included observation visits by teaching and research administrators to learn about the organization and function of American agricultural institutions including the agricultural extension services, university level research and training, cooperatives, farming systems research, water management, plant breeding, remote sensing, etc.

3.3.2. Visits to the United States by administrative-level Tunisians to observe the American Land Grant University in action with its triple responsibility for teaching, research, and farmer support activities convinced Tunisian leaders that (a) certain features of the American Land Grant University system can be usefully adapted to the Tunisian agricultural scene

and (b) that American graduate-level training in the agricultural and supporting sciences would be highly appropriate for training Tunisian agricultural specialists. Tunisian agricultural administrators became convinced that the science-based education and mission-focused research are a different and better approach than traditional methods for training specialists to develop and manage the new technology needs in Tunisian agricultural development programs.

3.3.3. It is suggested that the short-term training program be continued, and perhaps expanded. But it should be limited to specific situations where the evidence indicates that the participating scientist, technician, or agricultural administrator will gain something of value or importance to him and his country by engaging in a specific activity either in the United States or third country. With the return of more and more Ph.D. agricultural scientists, there will be an increasing demand for the financing of short-term activities such as attendance at meetings, seminars, conferences, etc. Examples of short-term training that might be usefully financed by the project include:

- attendance at international seminars, conferences, or meetings sponsored by the International Agricultural Research Centers and dealing with specific research problems of direct interest to Tunisia;
- participation in annual meetings of a professional society at which the Tunisian scientist would give a paper on research carried out in Tunisia;
- visiting at a particular American institution to learn specific scientific skills, methods, or procedures in cases where such a visit is the most cost-effective approach;
- attendance at an international seminar or conference to give a research paper, or otherwise actively participate as an officer, panelist, etc.

#### Recommendation

A selection committee composed of members of the ATT Coordinating Committee, plus any other person(s) the committee chairman deems desirable, should review the proposed activities and make recommendations regarding the need for the training as well as the type and place of training.

#### 3.4. GRADUATE STUDENT RESEARCH IN TUNISIA

The project envisioned that many of the theses for the Ph.D. would be based on field work and data obtained in Tunisia. Seven graduates are committed to do their graduate research in Tunisia. Although an excellent idea in theory, in practice a number of problems arose, making it impractical in many instances. Problems included lack of available transportation, limited access to computer services, lack of funds to buy needed equipment locally, and lack of a stipend for support while in Tunisia. The two most

difficult problems inhibiting Ph.D. research in Tunisia are (1) the lack of a GOT stipend for the candidate while doing research in Tunisia and (2) the very high travel and subsistence costs for the candidate and the U.S. advisor; if these problems can be solved, it is suggested that the new group of Ph.D. candidates do their thesis research in Tunisia.

### 3.5. NEXT TRAINING PHASE

The next phase of the ATT project will give graduate level training to 20 participants; 17 to the M.S. level and 3 to the Ph.D. The present plan is to focus on developing the capabilities of selected participants in the management skills required for agricultural development. Several directors of institutions and professors at agricultural schools have serious reservations about this mix of participants. They fear that some may be sent to the United States for training in a subject matter area in which they could be given adequate training at the M.S. level in Tunisia. We assume that M.S. level training will not be given in disciplines or subject matter areas for which equivalent training can be obtained in Tunisia. These disciplines include Cereal Breeding, Plant Pathology, and Rural Economy and Sociology, according to the Director of INAT.

### 3.6. RECOMMENDATIONS (ATT)

1. In view of the success of the graduate degree program, and the continuing need for additional Ph.D. research and teaching personnel, consideration should be given to providing for additional Ph.D.'s under any future project that includes an agricultural training component. (There is an inevitable loss of Ph.D. staff by transfer, promotion, resignation, etc. INRAT still does not have the number envisaged in the initial project proposal.) Continuation of a significant Ph.D. graduate studies program is needed until INAT has the capability to give an equivalent degree.
2. Additional Ph.D. staff for INRAT should be contingent upon a GOT solution to the lack of an equivalent salary for Ph.D.'s in agricultural research.
3. USAID should be sensitive to the need for periodic short-term training for self-improvement of the returned Ph.D.'s as described in 3.3.3.
4. Seminars and lectures by recognized authorities in the agricultural sciences have long been an important linkage mechanism employed by European scientists to maintain professional contacts and good will in North Africa. USAID should continue financing a number of seminars or lectures by American scientists on topics chosen by the U.S.-trained professors and researchers.

### 3.7. RELATIONS WITH CONTRACTORS

Tunisian relations with the contractor (MIAC) for ATT are smooth and constructive but relations with the contractor (AED) for TT are strained.

Both contractors have done useful work, but, without prejudice to the reputation of the existing contractor, the realities suggest the following recommendation.

#### Recommendation

Perhaps a new contractor is desirable, in due course, for TT.

### 3.8. TUNISIAN SCIENTIFIC AND UNIVERSITY MISSION

MUST is doing outstanding work with limited resources, under the leadership of Dr. Mahmoud Triki. With a staff of seven, it handles about 500 students. However, in our judgment, it is understaffed. Students complain, for example, of a shortfall in advice and counsel. Furthermore, in our judgment, MUST is extraordinarily dependent on the talents of Dr. Triki. These observations underlie the following.

#### Recommendations

The position supported by the contractor should be continued after the contractor withdraws. In addition, GOT should add a Tunisian deputy for academic affairs (as distinct from the deputy for administrative affairs) to MUST. This deputy should have a Ph.D. from a university in the United States. Dr. Triki himself would have more time to pursue institutional linkages, as the project (TT) matures, if he had a deputy for academic affairs, and a deputy would reduce the overall dependency on Dr. Triki.

### 3.9. EQUIVALENCY

Degree equivalency is still a nagging problem in some fields (albeit not in agriculture). The Equivalency Commission notwithstanding, ad hoc standards are said to be imposed by deans or directors of some units of the University of Tunis. We wish to reiterate, in addition, the importance of prompt official recognition of undergraduate engineering degrees and the importance of timely counseling of all participating students.

### 3.10. TRACKING STUDENTS

MIAC and MUST are adequately tracking the participating students. MUST, however, has a heavy caseload, so it should continue to expand and improve its management information system.

The returned graduates are difficult to track after placement in their first jobs. The informational pay-off is perhaps not worth a thorough effort by government staff.

Tunisian officials plan to establish an "alumni association" of degree holders from the United States. This idea is worthwhile for diverse reasons.

- The returned graduates may track themselves to a considerable extent by joining the alumni association.

- The alumni association may stimulate linkages via "demonstration effects."
- The alumni association may constitute an indigenous "pressure group" for degree equivalence not only in official theory but also in daily practice.

### 3.11. PROJECT DIFFERENCES

ATT is a fine example of "classical" participant training; graduate study in salient fields, with high rates of degree completion and return-to-country as well as placement/assignment to positions for which the candidates were trained.

TT is an unusual program of participant training; undergraduate as well as graduate training in salient fields. This project has ambitious goals. Briefly, in the short run, it aims to make up for the projected shortfall in the supply of engineers produced by the University of Tunis. (See Section 2 for details on scientific manpower.) And, in the long run, it aims to reorient the engineering profession in the American Style. This effort is a worthy experiment with outstanding students. American deans and faculty are very impressed with these students.

### 3.12. MUST BACKSTOPPING

MUST maintains a "hot-line" for Tunisian students studying in the United States in addition to contact with the Office of Admissions, the Office of the Registrar, and the Deans of Engineering where students attend. Regular reports on academic performance are requested and collected. Regular visits to the campuses are made. U.S. schools that have admitted Tunisian students speak highly of their relations with MUST.

## 4. ENGLISH LANGUAGE TRAINING

### 4.1. BACKGROUND

This report has been compiled from several sources: reports from and interviews with personnel of the Scientific Mission of Tunisia in Washington; reports from and meetings with Education and Agriculture Ministry officials and faculties of Tunisian institutes of higher education; and the reports of the 1980-1984 five-week Summer Intensive English and Orientation Programs in Tunisia; interviews with U.S.-based instructors involved in both the 1984 and 1985 five-week English programs in Tunisia; and interviews with Tunisian coordinators of the 1985 and earlier programs. Information on the five-week summer program was also provided by the former English Language Officer of the American Cultural Center in Tunis and from reports in the files of the English Teaching Division of USIA in Washington. These files also provided a general picture of the English teaching situation in Tunisia, as did reports from the Academy for Educational Development in Washington.

Teacher training was not assessed, but was of interest since training in the teaching of foreign languages (in this case, English) is relevant to the five-week program. The related but separate discipline of linguistics was not discussed or reviewed.

Information was gathered from TT and ATT participants now studying in the United States by means of a telephone survey questionnaire (Annex 4) administered to a random sampling of approximately 13.5 percent of the subject undergraduate population. Preparation was also made to interview a random sampling of the TT and ATT graduate students now studying in the United States. That survey was begun, but time constraints did not permit a significant number of graduate students to be interviewed. Some raw data concerning English language training in the United States for ATT graduate participants were gathered from Dr. Wendell McKenzie, the MIAC representative. A very few returned participants were interviewed in Tunisia. From data gathered from this limited sampling, the trend is toward the same profile as for the undergraduate participants.

Also interviewed less formally were the directors of 13 Intensive English Language Institutes, attached to universities, in which participants had been enrolled for English training. Time constraints did not permit assessment of English Language Institutes as yet not utilized for English language training for participants. Similarly, time constraints did not permit on-site visits to any IELP.

As of the date of this report, there are no TESOL volunteers included in the Peace Corps program in Tunisia and no English-language-teaching Fulbrighters.

### 4.2. LYCEE ENGLISH STUDIES

In order to elicit information on the English language learning background of the participants sampled, questions were asked concerning English language learning at the Tunisian lycée level of education.

The lycée provides the first English language learning experience for those Tunisians who are now TT and ATT participants. This course of study, spread over the 4th through 7th years, falls within the nonintensive "Language and Civilization" type. Instruction is given for two to three hours per week during the school year. Teachers are normally Tunisian. Seventh-year English is compulsory for Arts and Letters students; optional for the Math and Science stream--the category into which participants fall. All participants interviewed had opted for 7th year English. It is during this year that math and science students study some technical English and technical English vocabulary.

From the comments of the ATT and TT participants themselves and the written reports on English education in Tunisia in general, it appears lycée students do not take English study as seriously as they take other subject area studies. It is given little weight on the Baccalaureate examination compared to the weight given to other subjects taken by math and science students, and the subject has no immediate utility for them.

This view of English has dramatically changed for all the participants. Interviewees indicated an "if I had only known" attitude and felt that now there is another path available to higher studies in addition to the traditional ones, there will be an effect upon student attitudes toward the study of English at the lycée. If this is correct, it would be important in the mid- and long-term for the effects upon the subsequent English language training of the participants.

All participants pointed to the lack of attention to the development of listening and speaking skills at the lycée. However, all participants felt that the English learned at the lycée--especially grammar--had provided a good basic foundation upon which to build subsequent English language studies. The English proficiency of the participants upon completing lycée studies is unknown. A test given at the commencement of the five-week program is for the sole purpose of placing participants into as homogenous as possible groups of language learners.

The lycée English program does not include development of the listening and speaking skills to any great extent. The 7th year English program for math and science students could be a useful prelude both to the five-week IELP in Tunisia and the IELP in the United States by increasing the attention paid to the listening and speaking skills where necessary.

#### 4.3. THE FIVE-WEEK SUMMER INTENSIVE ENGLISH TRAINING AND ORIENTATION PROGRAM

The five-week intensive program is one of the two English language training programs provided for the preparation of the TT and ATT participants for academic studies in the United States. It would be useful to consider this program a preparation for and a transition to the IELP in the United States.

In 1985, the program was under the sponsorship of GOT/USAID; funding for the program was provided by USAID. In previous years, funding had been provided by USIA. Coordinators are now Tunisian; teaching staff are both

Tunisian and American. Two of the American teachers are recruited in the United States and come directly from U.S.-based intensive English language programs. In addition to their professional skills, they provide authentic models of American-English speech for the U.S.-bound participants. In the interests of continuity, one of the two is a returnee from the previous year.

Prior to 1985, the faculty of the National College of Technical Education (ENSET) was used to direct and staff the five-week Intensive English and Orientation Program. In 1985, the Bourguiba Institute provided the staff and the physical resources. Language laboratory facilities, provided they are the main Bourguiba facilities, are adequate. The 1985 "language lab" facilities are reported to have been inadequate and "worse than at ENSET."

Although there is no link at present between the five-week program and the Ariana School (the Pilot School) in Tunis, efforts were made to visit the school and its facilities. Unfortunately, the Directrice of the School was unavailable for any proposed meetings and protocol dictated the presence of the Directrice to receive visitors. Indirect information claims the Ariana classroom, dormitory, and language lab facilities to be the "most adequate" in the area for the five-week summer program.

The course is given in the summer and after the Bac examinations. When participants arrive for the program, they have already been selected for study in the United States. Level of proficiency in English is not a criterion in the selection of participants. Selection is based on academic record in the Math-Science stream at the lycée and, of course, on passing the Bac.

Graduate TT participants are required to be proficient in English before leaving for the United States and therefore do not receive language training.

Acquisition of proficiency by graduate ATT participants, however, varies. Some attend English classes at their own or other institutes; others find instruction independently; and some attend an ELI in the United States. The average amount of time needed by this latter group of participants to reach the required academic level of English proficiency is 4.6 months.

Since a January starting date for academic study in the United States is acceptable to MIAC, these graduates could attend the five-week summer program in Tunisia and then proceed to ELI training in the United States. However, it appears the pattern would need to be regularized not only for this latter group of participants, but also for other groups if they also attend the five-week program. Graduate students have appeared at the intensive program in the past but attendance has been spotty; some have arrived late, others have left early, and some have done both. Given that this administrative problem is taken care of and the required resources are available, there is no reason why the five-week summer intensive program could not handle this category of student.

Lack of English proficiency on the part of the category of "short-term" participants continues to be a problem, however. Solutions in the past have been to assign a selected short-term participant with minimal English to a U.S. ELI, or to assign an interpreter-translator to accompany the participant. Costs for these solutions are high and should not be considered under normal circumstances.

While recognizing that the short-term participant problem is not completely a TOEFL one, the following should be considered. But first, it is pointed out that the use of a TOEFL score or score range to indicate proficiency levels is a convenience only.

- Students who have minimal English, TOEFL 0-300 (Low Beginners), should not be considered or selected as short-term participants.
- Students who test at TOEFL 300-375 (High Beginners) should not be considered or selected as short-term participants.
- Students who test in the upper range of 375-425 (Low Intermediate) may be admitted to the five-week Summer Intensive English and Orientation Program, but only if both the program and the short-term participants meet the conditions outlined below.
- Students who test in the range of 425-475 (High Intermediate) should be absorbed into the five-week program, but given special attention to skill needs of the U.S. program.
- Students who test 475+ can be absorbed into the five-week program without special attention.

The conditions for short-term participants to be assigned to the five-week program are as follows.

An analysis could be made of the language and skills needed, based upon the participant's U.S. program. A special short-term program is organized for the participant within the five-week program, with a syllabus based upon the language and skill needs of the participant. There must be a sufficient number of instructors available to conduct the special program within the framework of the five-week program. Participants must attend the program in its entirety.

Participants receive six hours per day of formal classroom instruction in addition to less structured, nonformal activities. Equipment is available for out-of-class practice. There is a sufficient number of instructors to limit an instructor's formal classroom teaching load to four hours per day. (Students can handle a six hour per day instructional load; instructors cannot.)

Instructors are sufficiently experienced and competent to handle the special requirements of analyzing needs and diagnosing problems, designing, planning, and organizing the special program, and providing the classroom management and teaching skills required to meet the course objectives.

USAID/Tunis indicates that the competencies required for this special program are available in Tunis. Absent the above considerations and conditions short-term participants should not be assigned to the five-week program.

Orientation to living and studying in the United States is given by Tunisian-based Americans. These guest-lecturers and discussion leaders are drawn from both the official and unofficial American community. Tunisians who have returned from studies in the United States have lately been included as resources for the orientation.

Canada-bound (mainly French-speaking Canada) students have also been included in the five-week English program. Orientation for this group has in the past been successfully handled by the Canadian Embassy, but in 1985, no orientation program was provided. Problems in the past concerning the motivation of this group to study English appear--in the 1985 program at least --to have disappeared.

Lead-in time for both coordinator and instructors appears to be limited. For a time-limited program such as the five-week intensive English course, it is essential that sufficient time be allowed for a coordinator to design, plan, and organize the program in light of the special needs of the participants and of all resources available. A coordinator also needs time with the instructors to discuss the timetable and syllabus for the program, to set out its goals and objectives, and to agree upon a consistent approach and methodology to meet those goals and objectives.

Instructors need time to familiarize themselves with texts to be used and to prepare not only formal classroom activities but the nonformal teaching activities of the program as well. It is particularly important in an intensive language program that activities and their organization be planned in such a way as to offset the effects of both student and instructor fatigue. This kind of planning can only be done if time is allowed for it.

Each annual summer program has its share of problems and the 1985 program was no exception. Instructors appear to have had excessive formal classroom teaching loads. As a rule of thumb, each formal classroom teaching hour requires one to two hours of preparation. If instructors are assigned to teach all skills and all levels of student proficiency and if, in addition, textbooks are unfamiliar, preparation will be at the high end of the one to two hours--and probably over.

The student:teacher ratio approximates 23/24:1. While this is not fatal to a program, it requires a shift to teaching patterns that may not be the most efficient and effective for the structures and skills being taught. With this number of students per class, the size of the classroom becomes an important factor. A large number of students in a very small classroom--as in 1985--constrains the instructor further, and effectively reduces the options available as to class organization and teaching patterns.

Small rooms facing heavily trafficked avenues (with resultant high dirt and noise levels), poor equipment that doesn't work, and an inadequate supply of equipment that does are perhaps matters of inspection, negotiation, and assignment; heat, dirt, and noise, on the other hand, are perhaps matters of imaginative timetabling.

Teaching under difficult circumstances, clearly, does not result in a poor program, but a coordinator and instructors can function at a higher level of competency and efficiency under the least difficult conditions it is possible to organize and maintain.

No pre- and post-course tests to specifically measure gains in proficiency are given. A pre-course test (an incomplete Michigan Test of Language Proficiency) is given, but functions as a placement test only. It is generally held at ELLs in the United States that increases in proficiency cannot be expected in less than three months of intensive language training, and that the more appropriate and valid measures come from teacher evaluations together with raw scores on informal tests--both of which are reported on periodic ELI "Progress Reports."

Given the above, it is not possible to state the degree of proficiency gain attributable to the five-week intensive program.

Classes are organized to develop the traditional skills. No academic skills appear to be taught. Textbooks, which the students retain, are predominantly ELT Division/USIA-produced. Teachers supplement them where necessary with materials produced during the course. A practice TOEFL test is administered to provide practice in taking the TOEFL test. The "real" TOEFL test, given during the last week of the program, casts its shadow over the entire program.

In retrospect, participants consider the five-week intensive course to have been valuable. All the participants considered that orientation was an excellent idea, some found it valuable. Others, however, because of low listening comprehension proficiency, were unable to follow much of it. When necessary, orientation given in French or Arabic has now solved this problem. Participants thought the presence of Tunisian "returnees" to be very valuable, not least for the "nitty-gritty."

Students proficient in grammar would have liked to have spent less time in these classes and more time on developing listening and speaking skills. In addition to more attention to listening comprehension, participants would have liked more English for Special Purposes, but understood the problems involved.

Clearly, the five-week Intensive English Program has evolved and improved since 1980 as to content, organization, and administration into an English language training experience that the participants consider valuable. However, it is just as clear that there is confusion as to the goals and objectives of the program. This has led to a less coherent program and less consistent teaching practices. Pressures have built for the goals of the program to be "passing the TOEFL."

Examination of the 1985 TOEFL scores shows that 11 students of a total of 74 obtained scores in the low 500s. Of these, it is doubtful if a university would permit any to pass directly into academic studies without additional evidence as to English proficiency. Of the remaining 63 participants, the bulk fell into a range of low- and mid-400s to low-300s. This implies that the majority of the participants in the summer program were being coached to achieve an unattainable goal.

A practice TOEFL is legitimate if its purpose is to provide practice in taking this type of test. It can also be useful in showing students where they stand. But a TOEFL test, practice or real, should not be used as a blueprint upon which to build the syllabus for the English language program.

The goals of the Tunisian five-week IELP should be clearly stated in terms of the minimum levels of performance the student is to attain and the objectives written in terms of the successful completion of the requirements of that level. A student placed at Beginning level should, at a minimum, successfully complete the requirements for that level and be able to pass into the next higher level of the Intensive English Language Program in the United States. Similarly for the students placed at other levels. Low and high levels of "Beginners," "Intermediate," and "Advanced" are matters for determination by the coordinator and instructors based on their classroom experience and their extensive knowledge of a variety of teaching methods.

The syllabus of the five-week course should be two-tier: (1) fluency skills and communicative activities and (2) academic skills. For example:

- Beginners: emphasis on fluency skills and communicative activities, including reading and writing
- Intermediate: mix of fluency skills and communicative activities, including reading and writing, with academic skills
- Advanced: emphasis on academic skills; other skills and activities if and where needed.

The perspective on language and language teaching and learning has widened in recent years, and the intensive program lacks a certain state-of-the-art quality in skill area content and strategies for teaching. This is true especially in the area of academic skills. These skills are important for the upper level students in the program and should not be neglected.

#### Recommendations

4.3.1. The goals and objectives of the five-week Intensive English and Orientation Program should be directed towards optimizing the English language fluency/communication skills and academic skills of all students and directed away from the goal of "passing the TOEFL." Goals and objectives should be clearly articulated in terms of the requirements for successful completion of each level of proficiency to be attained.

4.3.2. The dates of the five-week Intensive English and Orientation Program and the administration of the TOEFL test at the end of the program should be such that the TT and ATT participants receive a full five weeks of intensive instruction.

4.3.3. The English Language Training Officer of USIA-Tunis should explore the possibility of presenting a state-of-the-art workshop/seminar for teachers and coordinators of the five-week Intensive English Program and other interested parties. The workshop/seminar should be of a week's duration or its equivalent in terms of time units convenient to the participants. The workshop should cover all skills including the academic skills and include adapting course materials for ESP.

This recommendation is proposed for the specific purpose of providing needed time for the five-week intensive program staff to consider, discuss, and plan, in general terms, all aspects of an intensive ELT program that can then be particularized to the specific five-week Summer Intensive English and Orientation Program in Tunisia.

4.3.4. The English Language Officer of the American Cultural Center should provide as much advice, assistance, and guidance to the five-week intensive program as possible. The following areas are suggested:

- curriculum/syllabus planning and organization as discussed in this report
- selection of texts and supplementary materials to be used
- provision of (or help in recording) substantial amounts of American speech in authentic situations--narratives or stories played to the class or read by the teacher for listening comprehension purposes, as is now the practice, are inauthentic as to style, medium, and purpose and do not accord with the students' needs
- films, videos, etc., for extracurricular activities
- consideration of expanding the five-week program to include participants in the Conventional Energy Program
- analysis and assistance in sorting out problems (and recommending possible solutions to the problems) associated with short-term participants

This recommendation is proposed for the specific purpose of lightening the burden of the coordinators and staff of the five-week intensive program by providing the useful inputs that, under time and resource constraints, program staff cannot.

4.3.5. Conditions of employment for teachers and coordinators should be clearly stated at the time of the invitation to participate in the program.

4.3.6. All staff should be contracted for their services. Such contracts should include number of days to be worked, including lead-in time, number of formal instructional hours to be worked per day (four), specific general expectations regarding nonteaching responsibilities and nonformal teaching activities, payment to be made and an acceptable payment schedule.

4.3.7. The lead-in time for the coordinator and teachers should be increased; to one week for the coordinator and three days for teachers prior to testing and placing participants and the opening of the program.

4.3.8. The formal classroom instructional load should be limited to four hours per day. This does not include normal nonteaching responsibilities or nonformal teaching activities.

4.3.9. The local teaching staff should receive the texts to be used in the course at least one week in advance of the intensive program for familiarization purposes.

4.3.10. U.S. instructors selected to participate in the program should be informed as much in advance as possible in order to arrange personal and professional matters and to make the desired preparation for the assignment.

4.3.11. Prior to the opening of the program, a meeting should be held between representatives of GOT and USAID/USIA and all staff to discuss protocol, lines of communication, expectations for the program, and other matters of interest and concern,

4.3.12. The Tunisian teachers and coordinators should be invited to participate in any informal panel discussions of Tunisian culture.

4.3.13. The appropriate official of the Canadian Embassy should be contacted in good time to ensure orientation for the Canada-bound students.

4.3.14. An IELP director of some university, with past and continuing responsibility for intensive language training for Tunisian participants, should be invited to Tunisia to participate in the five-week Intensive English Program. This would be a matter to be handled sensitively by all in light of his/her subordinate role as instructor, given his/her status as director of an American IELP.

#### 4.4. INTENSIVE ENGLISH TRAINING IN THE UNITED STATES

TT and ATT participants receive their English language training in the United States in Intensive English Language Programs (IELPs) at English Language Institutes (ELIs) attached to universities. These universities are not always the ones to which participants will be admitted for academic studies. However, wherever possible, efforts are made to provide for a nonstressful transition from English language training to academic studies on the same campus.

The duration of English training in the IELP varies according to the academic system in force at the university. Some participants, therefore, receive training in semester units--15 or 16 weeks--or quarter units--10 weeks. Since studies have shown that there is no correlation between TOEFL and academic success (Research Report #16, Educational Testing Service, Princeton, New Jersey) many universities do not accept the TOEFL as a valid predictor of academic success. Thus participants who have satisfied theoretical TOEFL entry requirements in Tunisia may be required to take tests at the university ELI as additional evidence of English proficiency in order to pass directly into academic studies. Of the four students in this sampling whose TOEFL score theoretically exceeded requirements for entry into academic studies, two were required to take a further test before being relieved of English requirements.

Attitudes towards the TOEFL test on the part of IELP directors differ, but tend to be negative. However, despite widespread concerns centering on the

limitations of a test such as TOEFL and the desirability of arbitrary cut-off scores, the test is commonly used as a criterion to determine whether or not a student will be required to attend an English language program prior to entry into academic studies. Directors of IELPs will generally recommend a TOEFL score (the student's) for acceptance by their own universities; and "all other things being equal," the recommendation is usually accepted. A common testing pattern at ELIs--with minor variations--is:

Placement test at

Beginning of course:	A TOEFL or other standardized test (in whole or in part) plus own university-generated test.
End of course:	A TOEFL or other standardized test (in whole or in part) in conjunction with final university-generated test.

Where used, a beginning (pre-course) TOEFL may also be used as a practice test to let the students know where they stand in the different skill areas. The results of the second (post-course) TOEFL are passed to the student's receiving institution. In general, universities will make available a form letter of notification that the student has or has not completed the requirements of the IELP. This letter may be accompanied by a final ELI progress report. As a matter of policy, universities do not make either beginning or final, formal, internally-generated test results available.

Pre- and post-IELP testing instruments differ from ELI to ELI and correlation between these instruments has not been established. Universities maintain generally restrictive policies concerning publication of student information. Hard data on participant English language achievement are therefore incomplete. The holes in the data, including TOEFL data, and the variety of measuring instruments--including subjective impressions by instructors, preclude any detailed analysis.

IELPs provide an intensive language program consisting of:

- four or five hours of instruction a day
- one hour of lab work a day
- two hours of homework a day

Placement tests put participants into three major levels: Beginning, Intermediate, Advanced. Some IELPs will provide multi-placements; skill areas are divided into levels of proficiency. A student can, therefore, be finely tuned in terms of his performance throughout the IELP. Other IELPs, for organizational reasons, provide only lockstep movement from one level to the next.

Other informal tests and quizzes are given throughout the course to provide feedback and counseling for the student. Information gathered from these tests, quizzes, and conferences is summarized on a "Progress Report" sent to MUST at regular intervals. Whatever the ELI, these progress reports are similar in format, but they differ as to frequency of submission, the number of variables marked or graded, and the labels given to the variables. Included in the progress reports are marks and grades for the skill areas or language elements and such items as homework, class participation, attitude toward language learning, and a record of lateness or absenteeism--both for the period in question and cumulatively. Teacher comments accompany the various marks and grades. A student will have a conference with an IELP staff member at least once a week. At the end of the course, participants receive an official attestation that they have successfully completed the requirements of the course. Granting a certificate of completion is quite a common practice.

IELPs arrange nonclassroom activities for participants, to allow use of English in nonclassroom situations. Foreign Student Advisors (FSAs) also arrange activities to help students integrate into the local community.

Participants themselves set up their own parallel nonformal English language learning program. In addition to participating in social activities arranged for them, students actively seek out American students with whom to talk; will join a systematic "conversant" program for conversation on a regular basis; share quarters with foreign students from other countries and so force themselves to communicate in English; go on "home visits" and "home stays" with American families; and read newspapers and magazines, listen to the radio, and go to the movies. Above all, students exploit the medium of television. Participants credit 40 to 50 percent of their language learning to nonclassroom activities, with television being rated the prime means of improving English.

Thus, the environment itself is a teacher. Students integrate the skills learned in the classroom and test out the knowledge and language needed to interact with and to manipulate the environment successfully. It is clear that participants benefit from this interaction of the environment and their formal English training, but the extent to which the level of English language proficiency is raised by this interaction is not known.

Most IELPs that participants attend are quality ones that differ in degree rather than kind. All offer state-of-the-art programs. The larger, more sophisticated programs will have skill specialists on staff and will more finely tune students to their proficiencies through multi-level placement.

IELP directors are aware of a general inability to provide Special Specific Purpose English because of the diversity of the backgrounds of students. Efforts are made to fill this gap; some students must attend a field-of-study lecture at least once a week, take notes, and present a summary to the class; guest lecturers from the different disciplines present mini-lectures to the students for the same purposes; and students do lab work with technical field-of-study materials. Students themselves try to make their own arrangements for sitting in on field-of-study lectures.

Policies vary at participants' universities concerning entry into academic studies of foreign students who have taken English language training elsewhere. Some universities require all entering foreign students to take a special composition course if they are entering from an ELI other than their own. IELPs at universities where a participant will enter into his academic studies will consult with the administration and provide a mix of measures of each proficiency--which are usually accepted.

Of the undergraduate subjects sampled:

- 14.29 percent passed directly from Tunisia into academic studies
- 3.57 percent took a reduced IELP in conjunction with academic studies
- 60.7 percent passed into academic studies after one semester or one quarter of English
- 10.71 percent required one semester or one quarter plus supplemental English in conjunction with academic studies
- 10.71 percent required two full semesters or quarters of English before passing into academic studies

Information gathered on 69 past and present graduate ATT participants shows that 17 had acquired, by one means or another, adequate English competency prior to arriving in the United States. Of the remaining 52 participants: 2 required eight weeks of Intensive English, 35 required one 15-week semester, 15 required more than one 15-week semester. The average duration was four to six months. The small number of present TT participants interviewed, who required no intensive English, had had an IELP prior to TT project undergraduate studies in the United States.

All undergraduate participants experience the normal student transition difficulties in entering into academic studies. No difficulties exist with the scientific subject matter content of class work since, participants state, it is familiar to them from their lycée studies, but participants continue to rate listening comprehension as their weakest skill. Lack of technical English is also felt to be a handicap. Class schedules are usually carefully arranged during the first year to include classes that require formulaic or passive English in class. Before the end of the first year, however, difficulties disappear. There are no participants, undergraduate or graduate, on academic probation.

Participants who reach a required TOEFL score in Tunisia and pass directly into academic studies experience difficulties also. These participants feel that students who take the IELP have a greater command of English and have more confidence in interacting in English than those who do not. Though they felt "ahead of" their colleagues by being excused English, they perceived themselves as "falling behind" as their colleagues entered into their academic studies.

Such comments from participants add to other anecdotal evidence and support research in progress concerning the relative advantages and disadvantages of direct admission of students scoring near the cut-off on the TOEFL. Such students do not get the opportunity to refine and expand their English language skills and to acquire American academic and study skills, nor do they receive an appropriate and necessary cultural orientation in a way that would maximally enhance the likelihood of a successful handling of academic studies.

Those participants scoring lower on the TOEFL, paradoxically, have the opportunity to attend an ELI and the chance to expand their language proficiency. At an ELI they are also exposed to an introduction to American educational practices and to life in the United States--all in a nonthreatening environment. These students profit a great deal from the opportunity to undergo this English language training before admission to academic studies.

The proportion of low GPAs with no intensive English (as shown in Annex 3) is improbably high but not statistically significant. Annex 3 shows GPAs for participants sampled (from universities with 4-point scales) and the duration, in hours of English required, before entering into academic studies. The correlation between GPAs and duration is very low and not statistically significant. Nonetheless, it is substantively significant; it confirms reasonable expectations. The correlation should be positive, as it is, or else the study of English is harmful to a student's GPA at universities in the United States. The correlation should be small, as it is, or else students of engineering are better advised to study more English rather than more engineering to improve their GPAs. The correlation indicates that the students' studies are being properly terminated by IELPs at universities in the United States. If the correlation was statistically significant, then something would be quite wrong.

Participants are correct in perceiving a continuing deficiency in the development of their listening skills. This perception of deficiencies arises from different sources. There is a need for a higher level of proficiency in listening because there is no control over what is heard and, as learners, students cannot process the information received at the necessary speed. Further, the materials and activities used in the five-week English program in Tunisia for developing listening skills tend to be of a conventional "listening comprehension" type that do not teach the skills necessary for efficient and effective listening. At the lycée level, according to participants, the enabling skills of listening do not receive systematic development.

In retrospect, participants perceive their intensive English language training both in Tunisia and the United States as effective. The lycée English, too, is accorded an important place in the entirety of their English language learning experience.

For their part, receiving IELPs have a positive image of the Tunisian participants. They are considered independent, intelligent, energetic and hardworking, and motivated towards their studies. They are considered to acclimate easily and well, and they do not "ghettoize" themselves in contrast to other named groups of foreign students.

It is a matter of some curiosity to directors of IELPs that most of the Tunisian students are able to complete their intensive English language training within a shorter time period than is generally predicted on the basis of prior experience and known expectations for foreign students. Good screening, prior foreign language learning experience, ability to effectively exploit the environment for learning purposes, perhaps the possibility that English is looked upon as a logic system rather than a memorization system, and a motivation based on need are no doubt factors in their success.

In considering an alternative model of all English language training to be done in Tunisia, it is useful to reiterate comments made elsewhere in this report.

Participants credited their personal, parallel, nonformal system of English language training with being responsible for 40 to 50 percent of their language learning--some participants placed the percentage higher. That is, half or more of the language learning that took place, took place outside the classroom in the American language and cultural environment, as participants themselves systematically exploited everything available to them as a language learning situation. This parallel system of language training is totally lacking in the Tunisian environment and could not be recreated there. The kind of multisensory learning and "living" the language can take place only in the environment and culture of the language being learned. Without this environment, language learning remains an artificial classroom exercise.

In or out of the classrooms, participants would be cushioned by their own culture and problems that arose would be solved in terms of that culture. There would be daily reversion to that culture and an absence of reality against which to test or utilize language learning. In the United States, participants are forced to be uni-lingual and uni-cultural in order to make their way and survive in their new environment. Each linguistic and cultural experience adds to and supports all prior linguistic and cultural experience. The optimal conditions for language learning exist during the IELP in the United States. Participants complete their English training in a remarkably short time and go on to academic studies where they repeat their above average performance. Outside-classroom language learning is one reason why this is so.

It is acceptable for Beginners--or "False Beginners," as virtually all the participants are--to be given initial language training in their own environment, as happens now in the five-week Intensive English Program. This program serves to activate lycée English and provides a foundation of English upon which to build the more complex program in the United States. Participants can grapple with this level of learning without the distractions and confusions of the environment. In that sense, the five-week duration of the intensive program is a pedagogically and psychologically sound decision. It is at the later IELP in the United States that students need interaction to confidently experiment with the new language and gain control over it.

Based on knowledge and experience, non-English-speaking countries do not set up indigenous ELIs. They do set up, however, institutes for teaching several foreign languages. Clientele is normally those who study English, let's say, for job needs in the domestic environment, or who travel abroad for

short periods and need English as a language for wider communication; a Roumanian government official, for example, travelling to Indonesia as a national representative at a trade fair. These foreign language institutes also undertake the language training responsibility for those foreign students accepted for long-term academic study. This is true of China, Russia, Japan, and other countries that award scholarships to foreign students and whose languages may not be widely taught in the native country of the student.

Insofar as the undergraduate TT project is concerned, a similar undertaking would mean that all English language training is given in the United States, with little or no orientation in Tunisia.

We know that language learning takes place during both the participant's lyc ee years and during the five-week intensive English course. We do not know the level of proficiency reached as to each or together.

We do not know what the necessary level of proficiency in English is for satisfactory academic performance and for the ability to understand and cope with the culture of academia. Furthermore, we do not know whether a certain level of English proficiency is required if a student is to make further progress in English without formal training. We do know, however, that the majority of the participants enter into academic studies after one quarter or one semester of intensive English language training in the United States and, academically, are successful. Tampering with the English program may result in jeopardizing the academic program.

It is reasonable to suppose, therefore, that participants would require one quarter or one semester plus, if all English training were to be given in the United States, to reach the same level of proficiency reached under the split Tunisia-U.S. language training program, and enter into academic studies. With an extra unit of language training, one quarter or one semester, it is possible that participants would reach a higher level of proficiency. However, any potential differential increase in proficiency might be offset by a decrease in learning efficiency as participants, arriving directly from Tunisia with little or no orientation, make the necessary and stressful adjustments to the local culture in general and the academic culture in particular.

Some ELIs offer summer, short-duration intensive English sessions, but the number of instructional hours offered and the costs of the sessions are comparable to the offerings of the scheduled academic year.

Student GPAs attest to the general success of participants in handling their academic studies through the medium of English. Benefits of intensive English study in the United States enter into this proxy for success.

Annex 5 presents data on an evaluation of two options for providing English language training for TT undergraduate participants: the present, "split" Tunisia-U.S. model, Option 1, and a model that would provide all English language training in Tunisia and direct entry into academic studies in the United States, Option 2. This option has been discussed earlier.

Intake of participants has been set at 80 per year, but both options allow for an increased intake.

It is assumed that Option 2 facilities would function on a 270-day year, year-round basis. It is further assumed that Option 2 would include the consideration of advantages and disadvantages of other measures to increase internal efficiency. Such measures--in addition to year-round use of facilities--would include a high use factor for classrooms; reduction of length of teaching period and increase in number of periods taught; student-teacher ratios; lengthening the week from five to five-and-one-half days; early and late shifts (particularly in summer to avoid the heat and noise of day); assignment of staff with special skills to teach primarily those skills; and imaginative scheduling of the different skill-classes to fit the participant freshness-fatigue-time rhythm.

Instructional staffing for Option 1 includes U.S.- and Tunisia-based Americans and Tunisian nationals. Staffing for Option 2 includes contract, expatriate Americans, Tunisia-based Americans, and Tunisian nationals. All instructional staff members in both options are assumed to be trained and experienced professionals in TEFL and Teaching English for Specific Purposes (TESP). While it is important that participants be exposed to as many varieties of American-English as possible and to the life and culture of the United States, it is not necessary that all staff members be Americans.

It is further assumed that at least one staff member (likely the Director) will have training and experience in materials development and test development.

Neither option considers the use of PCVs. Peace Corps-Tunisia does not at present have a TEFL program. In part this is due to difficulty in recruiting personnel with the required qualifications and experience. However, were there qualified TEFL-PCVs available, it is understood from PC officials in Washington that their use in a USAID-supported project would be problematical. (Should they be used, costs would be calculated at \$20,000 per year per PCV.)

Option 2 does not consider the use of "Generalist" PCVs or other non-TEFL personnel. In a 1983 PC-commissioned study (by a country in the North Africa, Near East, Asia and Pacific Region) to evaluate a long-running TEFL program that used generalist PCVs, it was found that students of PCVs did not do as well on tests as students of the national, trained TEFL teachers. Among other variables, PCVs used more of the students' native language in class than did their local counterparts; were not perceived as trained English teachers by their students, their colleagues, their sponsors, or the local community; nor were they perceived as "teacher trainers" by their colleagues or supervisors. On one variable only was there a significant difference between PCV and national teachers: students in PCV English classes had a more positive attitude towards their classes than the students in non-PCV classes.

This study was indirectly supported by a more complex and far-reaching 1984 study commissioned by the government of the same country for educational policy purposes and in response to a growing national concern that the standard of English and English teaching had deteriorated. Part of the study conducted involved the replication of a study conducted ten years earlier by essentially the same team of international specialists as the 1984 study. The same battery of tests was used in both studies. This part of the study covered a random sampling of schools throughout the country. Included in the

sampling were schools with PCV teachers and with a history of using PCV teachers. Overall, the study found that English and English teaching had not deteriorated, but it had not improved in the intervening years either.

Evidence from elsewhere is anecdotal, but supports the notion that, overall, generalist PCV TEFL programs are not as successful as trained TEFL PCV or trained national TEFL teacher programs.

The use of TEFL Fulbright personnel has not been included. Lowered costs are questionable because of the need for partly or fully subsidized housing in addition to other Fulbright costs. Turnover rate would add to costs since it is unlikely that Fulbrighters would wish to stay out of the academic career stream for longer than one year. In addition, it is questionable if Fulbrighters would be required or prepared to work a non-academic year such as would be in operation for Option 2.

Costs of both options have been calculated in constant 1985 US dollars, and include all costs borne by both the Tunisian and U.S. governments. A problem with such an analysis is that most of the costs are stated in terms of the highly industrialized United States while the future stream of investment benefits are stated in terms of a less industrialized Tunisia.

Some costs are "best estimates" while others are "average" costs. Since English language training by itself is not responsible for the stream of investment benefits, it has been necessary to estimate the costs of the basic academic program of the TT project and include these costs. This estimate has been made for both options and therefore any error will be the same for both.

Included also in costs for both options is the proportion of MUST support for participants and the costs of the AID-supported Academic Counselor. The costs of the decrease in learning efficiency during the first year of academic studies for Option 2 (when participants pass directly into studies from Tunisia and must acclimate themselves to living and studying in the United States and academia) are also included.

#### COSTS

	<u>\$ Per Year</u>
Aggregate estimated costs for Option 1	489,441
Aggregate estimated costs for Option 2	1,157,685
Aggregate estimated costs for basic TT-academic program	1,012,000

\$ Per Year

Disaggregate estimated costs--Option 1

Instructional building and equipment Dormitory and cafeteria buildings	30,800
Participant per diem	21,850
Staffing--Tunisia 26,060	
International travel (.5)	48,000
Participant support--MUST and Tunisia	37,211
Textbooks, Supplies, Testing	5,520
US-ELI English Language Training	320,000

Disaggregate estimated costs--Option 2

Lease--instructional building, maintenance, and instructional equipment and furniture	65,000
Dormitory and Cafeteria Buildings	180,320
Participant maintenance	189,856
30-place language laboratory, installation and spare parts: VCRs (2)	58,000
Staffing: Dir., Asst. Dir., 6 instructors	430,000
Support- and maintenance staff, vehicle and maintenance	95,000
Support-MUST and AID--supported Academic Counselor	34,388
Cost--decrease in learning efficiency due to acculturation and adaptation to academia	92,000
Textbooks, supplies, Testing	13,120

Benefits are likely understated for both options. It is difficult to determine precisely what share of income differential can be attributed to education and training since factors other than education and training explain why some people earn more than others. Nevertheless, the participants' basic income is the best available measure of the contribution to the economy's production of goods and services. It is anticipated that participants will be employed in both public and private sectors. MUST estimates that at least half the participants will be employed in the public sector. An average income, therefore, of private and public sector incomes was estimated.

For Option 1, the stream of benefits will begin between the 4th and 5th year of the project; for Option 2, the stream of benefits will begin the 6th year.

The distribution of the benefits of the project among the different groups of the population and the worth of the benefits to the different groups cannot be determined. Obviously, the worth of benefits for some groups has a higher value from a social standpoint than benefits to other groups.

It is assumed that other long-term benefits, such as benefits to the economy because of access to the American way of doing things, are the same for both options and are not therefore calculated.

Internal Rates of Return calculated at 10 percent (Annex 5, A:T2.RR2 and A:TALTER.RR2) and at 15 percent (A:T2-1 RR2 and A:TALTER 1.RR2) are lower than the 15 percent considered acceptable for an education project. Option 1, the present model, shows a higher rate of return than Option 2.

#### BENEFITS

	<u>\$ Per Year</u>
Wage Differential 10% \$7500 per annum x 80	600,000
Wage Differential 15% \$8625 per annum x 80	690,000

Additional benefits not quantified

Considering costs per participant for English language training:

Option 1	\$ 6,118
Option 2	14,471

A third possible option is all English language training in the United States. A rough estimate of costs for this option is:

2 semesters/quarters ELT in U.S. MUST and Academic Counselor Support International Travel	\$784,000
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Review of costs per participant for English language training:

Option 1	\$ 6,118
Option 2	14,471
Option 3	9,800

The estimated costs for the basic TT academic program per participant per year is \$15,729.

Costs are least for Option 1, the present model of split, Tunisia-U.S. English language training. Considerable savings in costs are possible in using Option 1 over the Option 2 (and Option 3) alternative. Since Options 2 and 3 are theoretical, it is not known how effective these models would be.

An alternate analysis of Tunisia-based English language training is included in Annex 12.

#### Recommendations

4.4.1. The present model, with modifications made to the five-week intensive course, should stand as is:

- o a five-week summer Intensive English and Orientation Program in Tunisia as a preparation for and transition to
- o an Intensive English Language Program in the United States as a preparation for and a bridge to academic studies.

Participants should continue to receive English language training at proven and quality ELIs of universities, whether participants will remain at that university for academic study or not.

4.4.2. Participants who enter academic studies directly on the basis of a TOEFL score should be urged/encouraged, nonetheless, to take an additional academic skills class in conjunction with their academic studies if offered at the IELP of the admitting university. There is evidence to suggest that direct admittance to academic studies may not be beneficial for some students and may be detrimental to studies. (See Annex 3 for the high proportion of low GPAs among students with no Intensive English.)

4.4.3. Students with a weak record in English--based on whatever information is available--should attend an IELP that offers a full 15- or 16-week semester of instruction to increase the chances of entering academic studies on schedule.

## 5. TUNISIAN-AMERICAN LINKAGES

### 5.1. INSTITUTIONAL LINKAGES (TT)

The government of Tunisia is involved in an enormous effort to meet growing manpower and employment needs through its higher education and research communities. It looks to the scientific and technological expertise in the U.S. educational systems to provide assistance. A major concern is how best to access this expertise and related technology.

One component that has been initiated is to establish institutional linkages to strengthen the capacity of Tunisia's advanced technological institutions. As proposed, each selected Tunisian institution would be linked to one U.S. institution. It has been suggested that a professor from the U.S. institution might serve as an institutional advisor to develop appropriate linkages in teaching and research and to serve as technical advisor on curriculum and institutional development. However, this concept needs to be further considered.

The development of institutional linkages provides for

- senior level U.S. professors visiting Tunisia for short periods to expose Tunisian faculty to U.S. curricula and pedagogic methods of several engineering schools, it is expected that this process will lead to new course content, teaching strategies, and related research, and
- U.S. study tours by Tunisian officials and faculty members to become acquainted with the U.S. higher education system, the tours will develop an understanding of major educational programs and research and will initiate what is intended to be lasting personal and institutional relationships with U.S. professionals.

### 5.2. VISITING U.S. PROFESSORS AND COMMENTS

Since 1983, more than 30 U.S. professors have visited or are planning to visit Tunisian institutions to interact in special areas. Recent visits are listed in Annex 2 according to Tunisian institutions. The U.S. professors who visited Tunisia were most grateful for the opportunity to participate in the program. Arrangements were excellent. They would be happy to play a continuing role if proper plans (including funding) can be arranged.

Many of the U.S. professors gave a series of seminars or several lectures, advised students, and discussed possible educational and research programs and their integration with society both nationally and internationally. Several were requested to serve on doctoral committees to provide guidance in the dissertation. They discussed specific research interests with the faculty members. Numerous students discussed the possibility of pursuing graduate studies at their U.S. universities. The students seemed highly qualified and were quite fluent in English.

Most of the U.S. professors were impressed with the ambition and strides made by the various schools, institutes, and faculties in spite of many constraints. The younger faculty members appear ambitious. It would be advantageous to utilize their ambition and to encourage it. The idea of sending these young people abroad for further experience and education seems well founded.

Other comments included the following.

- The present broad-based integration of applications and basic theory seems appropriate in the undergraduate program.
- More specialization would be appropriate at the advanced level to develop internationally acclaimed centers of excellence.
- Every effort should be made to carefully integrate programs with the private and public sectors. Industrial projects for students as well as faculty may help facilitate such cooperation.
- There is a drastic shortage of research journals and texts written in English. This should be corrected as soon as possible.
- Provide more incentives for faculty development.
- Improve the physical appearance so that the educational centers are clean and well groomed.
- Resolve the problem of instrument maintenance.
- Most schools are in dire need of a central computer facility and computer graphics laboratory.
- Faculty members should be encouraged to spend two or three months with a university research group in the United States.
- Each department of study should become identified with a unique and central research theme.
- An industrial advisory board should be organized for each department or faculty to maintain a strong interaction with industry.

### 5.3 U.S. STUDY TOURS BY TUNISIA'S FACULTY

A select group of faculty members associated with the development of new curricula, research areas, and laboratory techniques in the technology centers

of the University of Tunis were involved in U.S. study tours that began in 1984. The opportunity is a continuing one that will accommodate many others during 1986.

These Tunisian visitors to the United States have returned with glowing accounts of their experiences. For many it was their first contact with the United States and U.S. universities. Their trip reports described many interesting experiences: they improved their English; met many interesting professors eager to assist them; discussed mutual areas of teaching and research; became acquainted with many English texts, journals, research reports, and doctoral dissertations; attended seminars and lectures; attended professional conferences; gave seminars and lectures; and visited companies and government laboratories.

These professors have recommended longer stays for cultivating research in a meaningful way. Personal involvement is very necessary to establish firm contacts.

The bilateral short-term visits have produced a realistic awareness of how to modernize the curriculum. Visiting U.S. professors have left their imprint in a variety of disciplines offered in the engineering schools of Tunisia. Tunisian professors returning from U.S. study tours have been highly motivated to revise course contents, introduce new courses, and begin new research areas.

Results described are most encouraging. Now that considerable momentum has been generated, a course of action should be implemented to maximize technology exchange and to move toward the direction of cultivating centers of excellence.

#### 5.4. POSSIBLE LINKAGES UNDER CONSIDERATION

To date, initial linkages have been discussed informally involving six pairs of institutions, according to AED. They are:

<u>Tunisian School</u>	<u>U.S. School</u>
Ecole Nationale d'Ingénieurs à Gabès (ENIG)	University of Houston
Ecole Nationale d'Ingénieurs à Sfax (ENIS)	University of Wisconsin, Madison
Faculté des Sciences à Monastir (FSM)	University of Minnesota
Ecole Normale Supérieure d'Enseignement Technique (ENSET)	Ohio State University
Institut Supérieur de Gestion (ISG)	Pennsylvania State University
Institut Technique de l'Architecture et de l'Urbanisme (ITAAU)	Kansas State University

The evaluation team has been informed, however, that ISG has closer (and more promising) links with the University of Kansas than with Pennsylvania State University and that ITAAU has closer (and more promising) links with Georgia Institute of Technology than with Kansas State University. The foregoing list is, therefore, of doubtful validity.

### Recommendation

A Council of Engineering Directors should be established to:

- monitor preparation of five-year Master Plans by each school;
- discuss the five-year Master Plans and identify areas of cooperation and research initiatives;
- establish an equitable balance for faculty in teaching and research;
- establish a research fund to stimulate a margin of excellence in faculty not involved in joint projects;
- consider how best to arrange computer facilities to accommodate students, faculty, and administrators;
- schedule training for the faculty in the use of computers;
- arrange the continuation of bilateral short-term visits in different areas;
- arrange for equipment maintenance;
- develop a center for specialized library holdings;
- initiate the selection and acquisition of U.S. textbooks for the faculty, and
- discuss other areas of mutual interest.

### 5.5. INSTITUTIONAL LINKAGES (ATT)

Because ATT has existed longer than TT, the development of linkages in agriculture is somewhat more advanced.

5.5.1. The objectives of the linkage projects in agriculture are to facilitate a continuing flow of up-to-date agricultural technology to Tunisia through active professional relationships between Tunisian and U.S. agricultural scientists. This was to be accomplished mainly by engaging in short-term collaborative research in Tunisia on problems of mutual interest, consultant visits, and sabbatical leaves.

5.5.2. Three principal types of linkages envisioned for the future are: (a) research projects between a U.S. professor (usually but not necessarily a former academic advisor) and a Tunisian scientist, (b) sabbatical leave in the United States for Tunisian agricultural faculty and in Tunisia for U.S. faculty members, and (c) institution-to-institution linkages. Current linkage projects are listed in Annex 9 including comments on progress and problems identified during the evaluation. Annex 8 is an example of a linkage project that is making excellent progress toward achieving results that will be useful to both American and Tunisian agriculture. It conforms with all but one of the criteria described below. The project involves only one Tunisian scientist, a vegetable crop improvement specialist, but he will have access to the services of a plant pathologist should one be needed during the research period.

5.5.3. We interviewed in person the Tunisian scientists responsible for five of the eight collaborative research projects and four of the American collaborators by telephone. Two of the American professors said that their administration is not entirely convinced of the value of the linkage project to their state, and would like to have an overhead payment for the time spent by them on the project. Strict application of the criteria below for selection of linkage projects will help to avoid this potential problem.

5.5.4. The directors of the National School of Agriculture (INAT), the Agricultural Research Institute (INRAT), the Superior School of Agriculture at Kef (ESAK), the School of Horticulture at Chott Meriem (ESHCM), and the School of Agricultural Engineering (ESIER) want to have more linkage projects between their U.S.-trained staff and corresponding American scientists. Some have prepared new proposals for extending linkage projects now in progress or for new projects. The linkage projects provide Tunisian researchers with professional guidance and assistance needed during their first year of professional responsibility. In addition, the projects contain budget items that can be used for purchase locally of small but key items needed to keep the project moving. This flexibility is very essential until such time as the GOT procurement system operates more efficiently.

5.5.5. With some exceptions, the proposals submitted to the DERV are too individualized and do not seem to be integrated into the program of activities of the institution to which the researchers belong.

#### Recommendation

The following criteria for selection of collaborative linkage projects should be applied by a Selection Committee.

- The proposal is within the ministerial guidelines with respect to agricultural research priorities of the GOT; i.e.,
  - increasing food production, or
  - expanding agricultural exports.
- The proposal is within the focus of research of the institution at which the researcher(s) is located.

- The problem to be attacked is of significant mutual interest to Tunisia and the collaborating American university. This is vital to secure the interest of the American scientists and their administrators.
- The research proposal, preferably, involves a Tunisian team or institutional approach to the problem to be studied. We believe that the research team should be located at the same institution, not at different institutions, in view of the problems of communication, transportation, etc.
- The research to be undertaken is simple in concept and execution and one can reasonably expect useful results within two or three years of commencement of work.
- To be acceptable, the project must have the approval of the Director of the institution concerned.
- The proposed research falls within the discipline in which the Tunisian scientist was trained, or if it is to be a team effort, the principal leader of the team.
- It does not require the purchase of sophisticated equipment or machinery and requires only limited international travel.

5.5.6. Preparation of a research proposal satisfactory to all concerned is not an easy matter since it will be done in the absence of the collaborating American scientist. However, the Tunisian scientist may have had informal contacts with his American counterpart in which he "floated" ideas about collaborative research on specified problems. Taking into account the above criteria and what he knows about the interests of his potential American collaborator, the Tunisian scientist sketches out the problem to be investigated including why the research is important to Tunisia, briefly describes previous research in Tunisia, or elsewhere, in that area, and lists the major actions to be undertaken. After these initial plans are prepared the following steps are taken.

- (a) The proposal is submitted to the Director of the institution for his review, comments, and approval.
- (b) If the Director is in agreement, the Director and scientist and any collaborating Tunisian specialist(s) prepare a more detailed research proposal describing actions to be carried out, appending a bibliography of related research in Tunisia, and indicating which actions they deem most urgent. Proposals that do not involve a team effort should be accompanied by an explanatory note with supporting reasons for the individual approach.
- (c) The Director of the institution then sends the proposal to the ATT project director in Tunisia who forwards a copy to the proposed

collaborating U.S. scientist for his review, comments, and approval or rejection. He (she) may or may not be the Tunisian's former academic advisor.

- (d) If the U.S. professor agrees in principle to the proposal and makes suggestions and comments, these are incorporated in the project proposal by the requesting institution. If the U.S. professor is not interested in the project the proposal may be abandoned. In some cases it may be a good proposal and the U.S. professor simply does not have the time to take on additional work, in which case it may be desirable to contact another research worker at a different university.
- (e) The proposal is sent to a Selection Committee composed of the same members as the ATT Coordinating Committee plus the Director of the Agricultural Production Project. The Committee may call on the advice of any person of competence as needed.
- (f) Following Committee approval the proposal is forwarded to the ATT Project Director in MIAC for further action.

5.5.7. A good linkage project should provide the U.S.-trained scientists with the research advisory assistance needed to ease their transition from American academia to the "real world" of agricultural research and education in Tunisia. A limited amount of research apparatus and equipment also may be required. In some cases, the Tunisian scientists will have few problems in adapting to the Tunisian situation since they were full-time MOA employees before receiving U.S. training. In other instances, they may be new employees of the MOA with no research or administrative experience in Tunisia. It is suggested that a special effort be made to expand the research linkage projects to include all U.S.-trained scientists. Preferably, the projects should be multidisciplinary and include two or more Tunisian graduate-level specialists.

5.5.8. Sabbatical leaves for a limited number of Tunisian agricultural professors will contribute to the exchange and updating of scientific information and self-improvement. Priority should be given to professors in those disciplines of greatest interest and importance to the Ministry of Agriculture.

5.5.9. Two kinds of situations might occur. In one case, the Tunisian scientist knows where he wants to spend the sabbatical leave and may have already contacted a potential cooperating scientist(s). In the second case, he knows the particular kind of study, research, or other self-improvement activity he wants to undertake but is not sure which American institutions would best meet his requirements. In this case the MIAC officer would undertake to arrange a satisfactory program with the collaborating university.

5.6.10. ATT as amended also provides for two U.S. university professors to have sabbatical leaves in Tunisia. The ATT Coordinating Committee should be responsible for approving sabbatical programs financed by ATT. It is most likely that a U.S. professor wanting support for sabbatical leave in Tunisia may have already made contact with a former student who is now a staff member in one of the Tunisian educational or research institutions. Sabbaticals

between linked institutions should be given priority, but it seems desirable to keep the program open to other institutions, in view of the constraints of timing, availability, mutuality of interests, and the relatively large number of American Land Grant Universities involved in ATT. The main criteria for evaluating a sabbatical leave project are briefly outlined in the typical cases below.

- (a) The U.S. scientist wishes only to do research in collaboration with a Tunisian specialist. In this case:
  - his (her) research project should be on a subject of direct interest to the Ministry of Agriculture, and
  - he (she) need not be able to teach or speak fluent French, but should be able to read with understanding the available articles and papers relating to the selected subject.
- (b) A U.S. professor agrees to teach a course in one of the schools. In this case:
  - he (she) must be able to teach in an understandable manner in French.
- (c) The U.S. scientist will give occasional seminars and lectures to graduate students and faculty. In this case:
  - the use of English will likely be satisfactory.

When the time comes to choose the U.S. beneficiary for a sabbatical program in Tunisia, it is suggested that the program be given wide publicity, particularly in the United States and in universities where Tunisian agricultural graduate students have studied. Publications such as the journals of the American Society of Agronomy and other professional agricultural journals would be excellent media for publicizing the sabbatical leaves.

5.5.11. As in other linkage projects, a university relationship also must ultimately be based on or involve people with similar interests. It also will require some financial resources from both Tunisian and American sources. In addition, and most important, the relationship must be based upon genuine institutional commitments on both sides. It would seem likely that this type of linkage would best suit a situation in which both institutions are interested in interdisciplinary research of a regional nature, for example, farming systems; integrated pest management; problems on water storage, transmission, and use; biotechnology; small ruminant research; etc.

5.5.12. Support for institution-to-institution linkages will require more university resources than the one-on-one linkage described above. Consequently, there are likely to be fewer universities interested in this kind of commitment unless a convincing case can be made that serious participation will likely yield positive benefits to the U.S. institution. The following criteria are suggested for the selection and approval of this special type of linkage. Additional criteria may be needed.

- (a) The university has a known historical record of successful participation in international agricultural development programs, including significant commitment in the past of their own resources.
- (b) The university serves a state whose agriculture and agro-environmental conditions have readily identifiable similarities with Tunisia, i.e., crops, animals, plant and animal pests and diseases, desertification, water stress and salinity problems, etc. Obviously, the state served by the university under consideration need not have all the above characteristics in common with Tunisia.
- (c) A small team from the American university, including a representative from the administrative staff, visits the Tunisian institution to discuss, among other things, their mutual interests in such a relationship and how it could be structured. If the U.S. university is interested in pursuing the idea further, a similar visit by representatives of the Tunisian institution is suggested.

5.5.13. Consultant services provided by the ATT project have enabled the Ministry of Agriculture to install two modern reference libraries at INRAT and INAT and to equip a central soil analysis laboratory and several service laboratories in different agricultural regions. Other consultants have submitted reports on grape processing technology, the pathology of vegetable crops, agricultural machinery, and the use of computers in agricultural science. Annex 10 lists the names of consultants and the subjects of their consultations.

5.5.14. We can identify no changes in school curricula or teaching methods resulting from visits by American professors or consultants. However, as described in 3.2.7, important improvements in teaching methods and curricula have been introduced by the American-trained Tunisian agricultural scientists who are now teaching in the agricultural institutes and schools.

5.5.15. It is suggested that consultant visits be carefully managed to assure the following.

- The consultation is needed and desired by the GOT.
- The situation or purpose to be served by the consultant cannot be handled in another way.

#### Recommendations

1. Before final selection of a collaborative linkage project, MIAC should verify that the U.S. collaborating scientist and the Dean/Director of the cooperating Land Grant University are fully cognizant of the contribution their institution would be expected to make to the project.
2. The program of sabbatical leave in Tunisia for U.S. professors should be given wide publicity by placing notice in professional agricultural journals at least one year in advance of selection.

3. A very effective and powerful form of linkage for transfer of technology is membership in U.S. professional organizations and subscriptions to technical journals and publications. This requires dollars, and foreign exchange is frequently difficult for Tunisians to obtain for that purpose. Queries should be made of AID/W, USIA, UNESCO, or other agencies to determine if there is a general solution to this problem that could be applied in Tunisia.
4. We understand that the GOT through the ATT project has taken some steps to promote the organization of a professional agricultural society. We believe that this is a highly desirable effort and should be pursued vigorously. Specific activities of such a society might include:
  - inviting American agricultural scientists visiting in Tunisia to give lectures or talks on a subject of interest to the Tunisians,
  - sponsoring annual meetings at which papers would be presented by Tunisian researchers and invitational papers by American agricultural scientists might also be featured,
  - encouraging membership in U.S. professional agricultural societies and assisting in arranging for the foreign exchange needed to pay for memberships, subscriptions, books, and other publications,
  - serving as a repository for publications, e.g., journals, books, bulletins, research reports, etc., contributed as a good will offering by American scientists.

#### 5.7. AMERICAN REALITIES

The preceding subsections are separate examinations of the linkage aspects or prospects of the two projects (TT and ATT). Nevertheless, in principle, the character of linkages is identical for the two projects. The linkage experience of each project is relevant to the other project. Consequently, any particular recommendation should be considered as potentially applicable to both projects.

The evaluation team believes that valuable linkages have been forged under both projects: researcher to researcher and professor to professor. These linkages are worth continued cultivation by all parties, but there is a quantum leap from individual-to-individual linkages to institution-to-institution linkages.

The evaluation team is of the view that viable linkages are basically personal: student to professor, professor to professor, dean to dean, and, theoretically, rector to president. This individual level has been properly stressed in ground-breaking by AED. But now the ground is broken and a contractor is ill-suited to bring a linkage to fruition. What is desirable is peer-to-peer, one-on-one, and do-it-yourself follow-up to consolidate early efforts.

A rector-to-president link is merely theoretical for two reasons, from which a corollary follows. (1) There is no rector for the University of Tunis. An American university president has no peer in Tunisia. The Minister of Agriculture and the Minister of Higher Education and Scientific Research in Tunisia, for example, are not peers of university presidents in the United States. (2) American university presidents are scarcely involved in educational programming; research programs, curricula content, exchange programs, and so forth. This reality is manifest in large universities, and large universities are probably most interesting for linkage purposes. A president does not give orders to faculty in the United States.

Corollary: the presidential level is not promising for the development of linkages, in the view of the evaluation team. A presidential sign-off is perhaps useful for ceremonial purposes, if a pattern of linkages is already established.

The linkage of student to professor is terminated as a matter of course-- unless it is transformed, say, into a professor-to-professor linkage. (ATT is fostering such transformations with collaborative research grants.) Most student-to-professor linkages are transient states in the long run. We turn, therefore, to professor-to-professor and dean-to-dean linkages.

American deans commonly have the authority to commit their universities contractually. Department chairs and professors do not have that authority. Deans rarely teach or conduct research; the teaching and research are done by professors, including department chairs. Furthermore, a wise dean does not give orders to any faculty on matters of admissions, research, curricula, teaching, and so forth. This truism is manifest for deans and senior professors and, perhaps, the senior professors are of most interest for linkage purposes.

A dean, to implement a policy, must carry the faculty with him/her, if the policy is to endure. Likewise, a department chair or professor is likely to need the support of the dean to pursue a line of endeavor in the long run. Specifically, a formal link with another institution is almost certain to require the approval of the relevant dean, but actual activities are almost certain to require the initiative of willing professors.

The evaluation team is of the view that both deans and professors are indispensable for linkages in the long run. A concerted effort to develop linkages should focus on both deans and professors in any given university. The particular universities to be focused upon should be suggested by the experience of MUST and USAID.

Without prejudice to funding levels, the trick is to nurture a desire in individuals for linkages with Tunisia and to reinforce the desire by creating a network of awareness of linkages with Tunisia. Consequently, a concerted effort to develop linkages should focus on several departments, schools, or colleges in any given university. The professors and deans of engineering, agriculture, management, et cetera, should be simultaneous targets. Such a spectrum of units is likely to maximize the awareness on campus of linkages with the University of Tunis. The goal (in part) is to raise awareness so linkages are common knowledge on the university campus. Then, at any given

time, something does not need to be going on everywhere in order to maintain the linkage, if something is going on somewhere, it is known and that is enough.

Deans (and department chairs) are commonly on contracts for calendar years, not academic years. This constrains their time available for research or travel to Tunisia. But short visits are quite possible and probably desirable for cultivating linkages. Both deans and chairs are likely to appreciate such trips, but neither a dean nor a chair is likely to pay for on-the-job travel. Governmental funding is probably required for such travel to Tunisia. What benefits might result? Perhaps, for example, summer teaching for Tunisian professors in the United States. Deans and chairs often have discretionary authority in staffing summer sessions. Perhaps, also, improved prospects for student admissions. Department chairs often have substantial authority in admitting graduate students. Perhaps, finally, benign encouragement of professorial involvement with Tunisia. The activity of professors is the "nitty-gritty."

American professors are commonly on contracts for nine-month academic years. What is likely to interest the professors? The short answer is outside funding for academic year research, summer research, foreign travel, research equipment, computer time, graduate assistants, sabbatical leaves, and so forth. (AED was right to lead with foreign travel, for "consciousness raising.") Governmental funding is probably required. But, in addition to the foregoing, interesting problems and active researchers are professional attractions. GOT might usefully consider, as soon as funding permits, the creation of centers of excellence, to serve as magnets, by upgrading one (or more) of its existing research centers to appropriate international standards.

Broad institutional linkages--with a range of professors, chairs, deans, departments, schools, and colleges of a university--are only possible in English. French-speaking professors are rather scarce in the United States. (The departments of languages are the notable exception.) Language is a constraint on linkages. English-speaking Tunisians are a practical necessity for broad linkages with universities in the United States. ATT and TT are reducing the constraint, but it remains a difficulty.

The evaluation team is of the view that institutional linkages--broad and sustained, as distinct from ceremonial and episodic--will require the continued infusion of outside funds. Linkage activities should be encouraged with modest grants. Large grants and ceremonial signings are probably counterproductive (at least at this stage).

## 6. POLICY IMPACTS AND LESSONS LEARNED

### 6.1 POLICY IMPACTS

Tunisian officials view these projects in broad terms as (1) a means of access to science and technology in the United States and (2) a way to orient the country in the American Style. American-trained engineers, for example, are expected to be not only technically up-to-date but also less likely to be "desk bound." Such results take time to materialize (if indeed they occur eventually). The prospects are improved, of course, by the fact that these projects are conjointly a large-scale program. The hundreds of participants may create a pulse effect or a critical mass for sustained change in the desired direction.

There already are some indications of such change. Official appreciation (as distinct from official recognition) of degree equivalence is said to have been enhanced by Tunisian officials' visits to the United States. Faculty teaching styles are said to have been changed by professorial visits to the United States. Both results have been achieved by short-term visits.

The content of individual courses and the character of whole curricula have been affected similarly by long-term training. New lines of research have been launched. The returning holders of advanced degrees are having the desired impact. American degree holders are being integrated into the indigenous system. This is a slow process, a revolution from within institutions.

The Tunisian emphasis on education is reflected in these projects. The emphasis itself is a policy judgment: Tunisia must rely on skilled manpower; it cannot rely on abundant natural resources. The evaluation team sees these projects, therefore, as flowing with the current of existing policy in Tunisia.

These projects are largely run (and run well) by Tunisians. This management builds on previous projects with participant training in the United States. USAID programming has had a cumulative impact in Tunisia.

### 6.2 LESSONS LEARNED

1. In the early stages of the ATT project, it was thought that viable institution-to-institution linkages would evolve naturally from student/professor/institution relationships established during the Tunisians' graduate studies. This has not been the case, and it is now evident that effective institution-to-institution linkages also require promise of potential (including financial) benefits to the participating institutions.
2. Linkage projects involving collaborative agricultural research on problems of mutual interest must be developed carefully with all interested parties fully aware of their responsibilities (technical and financial) and convinced of the potential benefits that may be derived.

3. U.S. graduate-level training of highly capable students has equipped them with the skills, knowledge, and motivation that are sought after, not only in Tunisia but internationally. Consequently, it would be wise to encourage the host government to standardize the rewards and perquisites, particularly for Ph.D.-level scientists, among institutions and agencies of the GOT.
  
4. Participant training of undergraduate as well as graduate students can be conspicuously successful if participants are carefully selected and briefed (including preliminary language training). A supportive host government is also helpful, particularly in minimizing "brain drain." Such projects have cumulative effects if supported with multi-year funding. Dr. Mahmoud Triki's career is an example of such cumulative effects: past projects assisted him to acquire degrees in the United States. He is now the Director of MUST. TT therefore is grounded on earlier project(s) for some of its key personnel.

## 7. MISCELLANEOUS OBSERVATIONS

During visits and discussions held, specific observations were made that should be recorded for possible consideration. These are items that seem to stand alone and are very difficult to incorporate in the body of the report as part of the general exposition. These observations are listed below.

1. The relation of research to the overall educational mission is not clearly defined. There are sporadic research efforts, but the educational output of these efforts appears diffused.
2. The direction of growth in doctoral studies in engineering is vague. Some planning is needed to project how this area of future growth is to be accomplished.
3. The concept of developing centers of excellence in education and research does not appear too well developed. Efforts are too fragmented.
4. There should be a concerted effort to develop leadership to stimulate creativity and innovation so that a spirit of cooperation and a true community of scholars is allowed to emerge in each discipline--regardless of location.
5. There is an Agency for Investment Promotion that is concerned with the availability of manpower in the industrial sector. Perhaps this Agency can serve as a vehicle to stimulate interest in future research.
6. Videotapes made in the United States are not compatible with tape players in Tunisia. A conversion mechanism is available and can be purchased. The availability of such a device should be publicized.
7. Students going to the United States for the MBA should be advised whether the degree is acceptable for teaching in Tunisia. There is some confusion.
8. There is a Tunisian Society of Engineers that is concerned with the professional status of engineers.
9. There is a strong feeling that private industry would like to donate funds to engineering schools for research and special types of education. But such donations cannot be exempt from the tax structure. However, there is legislation being proposed to create a fund to assist schools.
10. There is cooperation between the educational sector and the industrial sector in the area of projects for students and projects for professors. Project funds are available on a competitive basis.
11. There is some continuing education going on for professional development of practicing engineers in the Gabès area. It seems to be an effective mode that should be duplicated in other city centers where industrial concentrations prevail.

12. There is a consensus among all the engineering schools that the Technology Transfer Project should provide for equipment acquisition in areas where research is beginning to emerge.
13. Book allowance for study tours of Tunisian professors is much too low. Only \$250 is set aside per tour. It should be at least doubled considering that American texts are in great demand by Tunisian professors.
14. Several returning Tunisian professors on study tours expressed dissatisfaction with some arrangements. Schedules were too slow in coming.
15. Students returning with Ph.D. degrees from studies and research in the United States come with advanced technology. However, once in Tunisia, they do not have access to such equipment to do their research.
16. An International Conference on Automation and Simulation was held during the week of November 25, 1985, at the Faculté des Sciences et Techniques in Monastir. This is an example of a fine activity. It was organized by Monastir.
17. There are a number of professional societies in Tunisia such as the Tunisian Society of Chemical Engineering. Meetings are held periodically and proceedings are published on current topics.
18. Some Tunisian professors have not had the opportunity to review trip reports of U.S. professors. Reports were not distributed to their attention.
19. There is a strong coupling with French schools. The French Embassy supports this kind of research by
  - sending professors from France to teach special courses (France pays half of the salary);
  - receiving Tunisian faculty to prepare for the Doctorat d'Etat in France;
  - making available the use of special research equipment in France.

This is an outstanding example of educational cooperation between countries that should serve as a model to others.

20. ATT Project. One should not be misled by the title of the ATT Project--chosen for good reasons at the time of project development--since experience has shown time and again that agricultural technology is usually location specific. This means that careful selection of promising technology, or development of new technology, must include scientifically valid testing and verification in the particular agro-environmental region of use. This project provides the first essential requirement in agricultural technology transfer: well-trained, motivated agricultural scientists.

For the MOA to profit fully from the ATT project, the next step is to assure that the agricultural researchers and professors are provided with the necessary working conditions and incentives to do applied research, to develop or adapt new technology, and to teach their skills to others.

21. ATT Project. The MOA is in agreement with the basic concept of the American Land Grant University, i.e., teaching of agricultural sciences, applied research to develop new agricultural technologies, and extension all operating as a single system. Although some steps have been taken in that direction in the MOA, it is suggested that progress be intensified. A useful action in that direction would be to include the American-trained staff of INRAT on the part-time teaching staff of INAT in cases where their particular specialization would strengthen the teaching program.
22. ATT Project. The returned M.S.'s and Ph.D.'s were exposed to the team concept (multidisciplinary) of research in the United States. It is suggested that the MOA review research proposals for the purpose of applying the team concept where it is obviously the best approach.
23. ATT Project and TT Project. It is the consensus of the team that, in comparing the condition and quality of laboratories and libraries in all institutions visited, the latter come off second best.

## ANNEX 1: THE UNIVERSITY OF TUNIS

The University of Tunis, as the only university in the country, is vital for meeting the future needs for scientific and technological manpower in Tunisia. The University of Tunis does not have a central campus. The units of the university--*faculté, école, institut*--are numerous, scattered, and specialized. The University of Tunis, in short, is a "holding company." Ministry officials and academic administrators foresee the formation of three universities, when the system is completed in due course, headquartered at Tunis, Sfax, and Sousse/Monastir. The operative word is headquartered: units will remain scattered. Le Kef, Kairouan, Gafsa, and other cities will continue to contain units. This geographical scattering is probably politically advantageous.

The university system's enrollment has grown at an exponential rate from 2,268 students in 1955/56 to 34,860 students in 1984/85. (See the graph at the end of this Annex.) Linear regression on the natural logarithms is a good fit (correlation = 0.988). A statistical estimate of the value of the exponential parameter is 0.109 (= 10.9 percent annual growth). The doubling time is therefore about 6.3 years. These figures are close to a rule-of-thumb used by an official of the Ministère du Plan: 10 percent annual growth with a doubling time of seven years.

What is the carrying capacity of Tunisia? How large a university system can it sustain in the long run? The country's population is 7 million (and growing). By American standards, therefore, the answer is: approximately two large state universities (each 25,000 to 30,000) plus one middle sized state university (say, 15,000 to 20,000) for a total enrollment of 65,000 to 80,000. This estimate is judgmental and perhaps an upper limit. The American system of mass education at the university level is historically novel in world terms. However, as shown below, an exact estimate is not required for drawing conclusions.

The foregoing facts are significant for manpower planning in general and for scientific manpower in particular. We suggest the following, inter alia.

- a. Exponential growth that "punches through" a carrying capacity is commonly destabilizing in human systems. American higher education, for example, was plunged into crisis by its failure to foresee and to plan its leveling-off in the late 1960s and early 1970s.

The University of Tunis' growth (if not checked) will punch through the country's carrying capacity in about seven years. This lead time is not long for institutional planning. President Bourguiba's vision for higher education is within sight.

If exponential growth is to be transformed into logistic growth to smoothly approach the estimated carrying capacity via an S-shaped curve, then hereafter the annual rate of percentage growth "must" decline from year-to-year (to zero in due course). (See the graph at the end of this Annex.) A mathematical note: the logistic curve is now at its inflection point in terms of the above estimates.

- b. The growth in the number of students has been paralleled by the growth in the number of units--*faculté, école, institut*-- from about five in 1955/56 to about fifty in 1984/85. With approximately 40,000 students and fifty units, the average unit now has approximately 800 students. This average figure is disturbingly low for scientific and technological units. (In 1984/85, the only units with more than 2,000 students were the *Faculté des Lettres* (5,774), *Faculté de Droit et des Sciences Politiques et Economiques* (5,088), *Faculté des Sciences* (4,168), *Faculté de Médecine de Tunis* (2,518), and *Faculté de Théologie* (2,114).)

American centers of excellence in science and technology are scarcely ever smaller than 3,500 students. The California Institute of Technology (1,700, mostly graduate students), Colorado School of Mines (2,900), and Rensselaer Polytechnic Institute (5,900) were used to compute that average minimum. These three universities are not only private schools but also well-endowed institutions. Cal Tech's (\$208 million) and Rensselaer's (\$127 million) endowments are among the top fifty university endowments in the United States. The 3,500 estimate is, therefore, perhaps a lower limit for scientific units in the University of Tunis.

The adverse effect of the small size of scientific units is accentuated by their dispersed locations in Tunisia. A critical mass is needed for sustained excellence in scientific endeavor for diverse reasons. Perhaps two illustrations are sufficient for this point.

- a. Laboratory equipment and library collections are very expensive and, consequently, a high level of usage of basic equipment and basic books is necessary to justify the overall cost (which includes specialized equipment and research journals). Such intensive usage comes from large student bodies.
- b. Multidisciplinary and interdisciplinary research is fostered by propinquity and proximity of kindred disciplines, by walking down the hall rather than traveling across town or from town to town. Such multidisciplinary endeavors are vitally important for scientific and technological development--witness the synthesis of the sciences of physics, management, and engineering in Silicon Valley.

The foregoing observations lead to the following recommendations. New units--*faculté, école, institut*--should be established sparingly and with prudent forethought to the units' contributions to the completed university system (at about 80,000). Most growth in scientific fields should be channeled into existing units to increase their size. "Planning backwards" is probably desirable--that is, plan backwards to the present from a conception of the system at its carrying capacity (approximately double its present size).

74,000

-59-

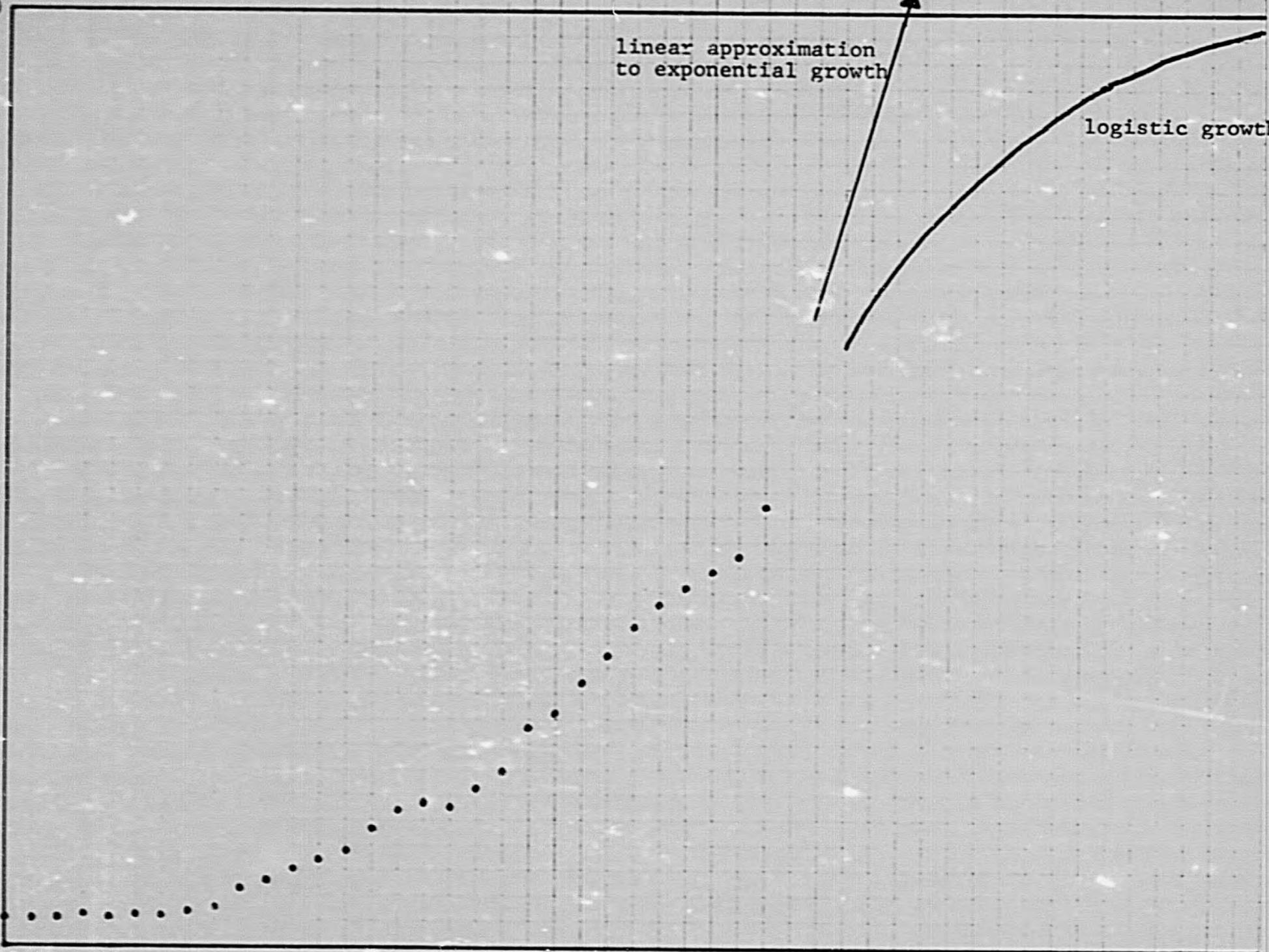
linear approximation  
to exponential growth

logistic growth

2000

1955/6

1984/5



ANNEX 2: VISITS BY U.S. PROFESSORS

- Ecole Nationale d'Ingénieurs à Gabès (ENIG)

H. W. Prengle, Jr.	Development of
L. C. Witte	Curriculum in
University of Houston	Chemical Engineering
  
- Ecole Nationale d'Ingénieurs à Sfax (ENIS)

M. R. Barry	Medical Engineering
University of Wisconsin, Madison	
P. Groumpas	Joint Research Areas
Cleveland State University	
H. S. El Khadem	Documentation Center
Michigan Technological University	
B. V. Koen	Methods of Engineering
University of Texas (Austin)	Education
E. W. Wang	Micro-electronics
Arizona State University	
  
- Faculté des Sciences et de la Technologie à Monastir

S. Bomar	Chemical Engineering
Georgia Institute of Technology	
S. Fletcher	Mechanical Engineering
University of Minnesota	
S. Pelloux	Materials Engineering
Massachusetts Inst. of Technology	
A. Vacroux	Computer Education
Illinois Inst. of Technology	
  
- Ecole Normale Supérieure d'Enseignement Technique (ENSET)

Peter Groumpas	Joint Research
Cleveland State University	
R. R. Mokler	Program Development
Oregon State University	
S. Sebo	Electrical Engineering
Ohio State University	
A. Vacroux	Computer Education
Illinois Inst. of Technology	

● Institut Supérieur de Gestion (ISG)

S. C. Aggarwal  
Pennsylvania State University

Industrial Management

J. R. Behrman  
University of Pennsylvania

Management Program

A. D'Amato and L. Papayanopoulos  
Columbia Business School

Information Technology

● Ecole Nationale de Information Scientifique (ENIS)

M. Geria  
University of California  
(Los Angeles)

Computer Science

F. Tobaggi  
Stanford University

Computer Science

Adel El-Ansary  
George Washington University

Business Management

ANNEX 3: CORRELATION OF GPA AND DURATION OF ENGLISH LANGUAGE TRAINING

(English language training and grade point averages  
of sample undergraduates (management and engineering)  
in the United States, Fall 1985)

<u>Duration of Training (hours) in U.S.</u>	<u>Grade Point Average</u>
0	2.50
0	3.43
0	2.49
0	3.88
75	3.45
250	3.15
250	3.04
250	3.29
250	3.65
250	3.71
300	3.65
375	4.00
500	3.24
500	4.00
200	3.24
262	3.85
350	3.09
300	2.32
375	2.91
375	3.65
375	3.95
375	2.50
375	3.18
375	3.24
375	3.25
750	3.20
450	3.74

Correlation = 0.169, slope = 0.00047, intercept = 3.18.

ANNEX 4: STUDENT ENGLISH LANGUAGE TRAINING QUESTIONNAIRE

Date: \_\_\_\_\_

Code No. \_\_\_\_\_

I. PERSONAL DATA

1. Name: \_\_\_\_\_ 2. Sex: \_\_\_\_\_
3. For which degree are you studying now? \_\_\_\_\_ Field: \_\_\_\_\_
4. Name of institution at which studying: \_\_\_\_\_
5. When did you begin your academic studies? \_\_\_\_\_ 19\_\_
6. Have you taken an international TOEFL test? \_\_\_\_\_ Score: \_\_\_\_\_
7. Where taken \_\_\_\_\_
8. What is the cut-off TOEFL score for your institution: \_\_\_\_\_
9. Have you taken other TOEFL tests? \_\_\_\_\_
10. Date(s) \_\_\_\_\_ Score(s) \_\_\_\_\_
11. What is your present GPA? \_\_\_\_\_

II. ENGLISH STUDIED PRIOR TO PARTICIPANT TRAINING IN THE UNITED STATES

12. Did you study English at the lycée in Tunis? YES \_\_\_\_\_ NO \_\_\_\_\_
13. For how many years? \_\_\_\_\_ FROM \_\_\_\_\_ class TO \_\_\_\_\_ class
14. Did you take the 7th optional year? YES \_\_\_\_\_ NO \_\_\_\_\_
15. How many hours per week did you study English at the lycée? \_\_\_\_\_
16. Which areas of English did you study?  
Gr      L      S      R      Wr      CULT. and CIV.
17. Which areas were stressed?  
Gr      L      S      R      Wr      CULT. and CIV.
18. Did you study technical English?  
No      Little      Not much      A lot      OTHER

19. Was your lycée course helpful to your later studies in English? \_\_\_\_\_

In what way(s)?

Comments \_\_\_\_\_  
\_\_\_\_\_

The Five-week Summer Intensive English and Orientation Program in Tunisia

20. Did you attend the five-week Summer Intensive English Program?

YES \_\_\_ NO \_\_\_

(If No go to question 25)

21. Give dates of training program: FROM \_\_\_\_\_ TO \_\_\_\_\_ 19\_\_

22. Did you take a TOEFL test at this time? YES \_\_\_ NO \_\_\_ SCORE \_\_\_

23. How would you rate this English program?

Very Valuable                      Valuable                      Not So Valuable

Some of it Was Valuable                      Not Valuable At All

24. What was the weakest part of the English program?

Comments \_\_\_\_\_  
\_\_\_\_\_

25. Did you attend any other English program in Tunisia? YES \_\_\_ NO \_\_\_

Where? \_\_\_\_\_

26. For how long? \_\_\_\_\_

III. INTENSIVE ENGLISH LANGUAGE PROGRAM IN THE UNITED STATES

27. Did you have an IELP in the U.S.? \_\_\_\_\_ Where \_\_\_\_\_

28. Dates: FROM \_\_\_\_\_ TO \_\_\_\_\_ 19\_\_

A semester/quarter?                      More than \_\_\_\_\_                      Less than \_\_\_\_\_

29. How intensive was the English program?

\_\_\_ hours per day \_\_\_ days per week

30. What kind of test was your placement test? \_\_\_\_\_ Score \_\_\_\_\_

31. In which class were you placed? Beg.                      Int.                      Adv.

32. What kind of final test did you have? \_\_\_\_\_ Score? \_\_\_\_\_



ANNEX 5: DISCOUNTED COSTS AND INTERNAL RATES OF RETURN:  
 OPTIONS 1 AND 2 ENGLISH LANGUAGE TRAINING  
 (in thousands of constant 1985 US dollars)

YEAR	COSTS	BENEFITS
1	-1137.6	0
2	-1012	0
3	-1012	0
4	-1012	0
5	-1012	0
6	0	690
7	0	690
8	0	690
9	0	690
10	0	690
11	0	690
12	0	690
13	0	690
14	0	690
15	0	690
16	0	690
17	0	690
18	0	690
19	0	690
20	0	690

\*\*\*\*\*

INTERNAL RATE OF RETURN

program written by  
 Jose Dominguez-Urosa

\*\*\*\*\*

THESE ARE THE PRESENT VALUES... DISCOUNTING ...

1.00	5144.40	1.36	-2592.28
1.01	4087.20	1.74	-2271.07
1.10	-780.92	2.72	-1727.98
1.19	-2127.90	5.06	-1357.53

CHOSEN FOR INTERP 1.01 1.1 CPV1= 4087.201 PV2=-780.9169 J

VERIFYING...

CHOSEN FOR INTERP 1.071875 1.0775 CPV1= 134.0505 PV2=-78.98316 J

THESE ARE FINAL VALUES: 1.076094 ( 134.0505 J  
 AND 1.0775 (-78.98316 J

THE INTERNAL RATE OF RETURN IS 7.70 % (7 - 7.8 %)

A. TALTER I.R.R.

Press space bar to continue

YEAR	COSTS	BENEFITS
1	-1157.6	0
2	-1012	0
3	-1012	0
4	-1012	0
5	-1012	0
6	0	600
7	0	600
8	0	600
9	0	600
10	0	600
11	0	600
12	0	600
13	0	600
14	0	600
15	0	600
16	0	600
17	0	600
18	0	600
19	0	600
20	0	600

\*\*\*\*\*

INTERNAL RATE OF RETURN

program written by  
Jose Dominguez-Urosa

\*\*\*\*\*

THESE ARE THE PRESENT VALLES...      DISCOUNTING ...

1.00	3794.40	1.36	-2663.90
1.01	2889.04	1.74	-2284.19
1.10	-1248.47	2.72	-1728.94
1.19	-2351.54	6.06	-1357.55

CHOSEN FOR INTERP 1.01      1.1 [PV1= 2888.038    PV2=-1248.472 ]

VERIFYING...

CHOSEN FOR INTERP 1.055      1.060625 [PV1= 156.6871    PV2=-73.08875 ]

THESE ARE FINAL VALUES: 1.035 [ 156.6871 ]  
AND 1.056406 [ -73.08875 ]

THE INTERNAL RATE OF RETURN IS 5.50 % (-/+ .5 %)

A: TALTER.RR2

Press space bar to continue

YEAR	COSTS	BENEFITS
1	-489.44	0
2	-1012	0
3	-1012	0
4	-1012	0
5	-1012	315
6	0	690
7	0	690
8	0	690
9	0	690
10	0	690
11	0	690
12	0	690
13	0	690
14	0	690
15	0	690
16	0	690
17	0	690
18	0	690
19	0	690
20	0	690

\*\*\*\*\*

INTERNAL RATE OF RETURN

program written by  
Jose Dominguez-Urosa

\*\*\*\*\*

THESE ARE THE PRESENT VALUES...      DISCOUNTING ...

1.00	6157.56	1.36	-1823.80
1.01	5086.90	1.74	-1565.59
1.10	122.88	2.72	-1053.52
1.19	-1286.04	6.06	-589.12

CHOSEN FOR INTERP 1.1      1.187153    IPV1= 122.8828    PV2=-1286.038 J

VERIFYING...

CHOSEN FOR INTERP 1.1      1.105447    IPV1= 122.8828    PV2=-21.02388 J

THESE ARE FINAL VALUES: 1.1 I 122.8828 J  
AND 1.101562 I -21.02388 J

THE INTERNAL RATE OF RETURN IS 10.12 % +/- .5 %

A: T2 1. RR2

Press space bar to continue

YEAR	COSTS	BENEFITS
1	-489.44	0
2	-1012	0
3	-1012	0
4	-1012	0
5	-1012	300
6	0	600
7	0	600
8	0	600
9	0	600
10	0	600
11	0	600
12	0	600
13	0	600
14	0	600
15	0	600
16	0	600
17	0	600
18	0	600
19	0	600
20	0	600

\*\*\*\*\*  
INTERNAL RATE OF RETURN

program written by  
Jose Dominguez-Urosa

\*\*\*\*\*

THESE ARE THE PRESENT VALUES...

DISCOUNTING ...

1.00	4762.56	1.36	-1908.51
1.01	3844.49	1.74	-1583.56
1.10	-375.41	2.72	-1055.29
1.19	-1532.34	6.06	-689.16

CHOSEN FOR INTERP 1.01 1.1 [PV1= 3844.491 PV2=-375.408 ]

VERIFYING...

CHOSEN FOR INTERP 1.083125

1.08875 [PV1= 61.19074 PV2=

-96.00488 ]

THESE ARE FINAL VALUES: 1.084531 [161.19074 ]  
AND 1.085938 [-96.00488 ]

THE INTERNAL RATE OF RETURN IS 8.51 % (-/+ .5 %)

Press space bar to continue

A: T2. RR2

ANNEX 6: DEGREE-GRANTING INSTITUTIONS

<u>University</u>	<u>Number of Degrees**</u>	
	<u>M.S.</u>	<u>Ph.D.</u>
University of Missouri*	10	9
Kansas State University*	4	6
University of Nebraska*	6	3
University of Arizona	4	1
Iowa State University*	1	3
Oregon State University	2	3
Colorado State University	1	3
University of Florida	2	2
University of Georgia	3	1
Oklahoma State University*	2	
University of Wisconsin	1	2
University of California (Davis)		2
University of North Carolina	1	
University of Minnesota		1
Utah State University	1	
Montana State University		1
Cornell University		1
Washington State University	1	
University of Illinois		1
	<hr/>	<hr/>
Totals	39	39

\*MIAC Universities

\*\*It is assumed that students still in the universities will meet all degree requirements.

## ANNEX 7: SHORT-TERM TRAINING 1981-85

<u>Name</u>	<u>Post</u>	<u>Kind of Training</u>	<u>Length (days)</u>
Souad RIAHI	INRAT	Methods of Soil Analysis	50
Hadef HAFAIETH	INRAT	Library	24
Hassiba CHEBAANE	DERV	U.S. System of Agri. Training and role of cooperatives in agricultrural extension	30
Abderrahman JERRAYA	INAT	Relation between research, teaching, and extension	18
Salem LAOUAR	ESH-CM	Horticultural Programs in U.S. universities	23
Ali Ben ZAID SELMI	INAT	Farming Systems Research	22
Moncef BEN SAID	INAT	Cooperatives and Extension	
Nourreddine ENABLI	INAT	Visit to hydraulic installations, and agric. engineering departments	30
Jalila BEN ZARTI	INRAT	Participation in remote sensing course	32
Mohamed BRINI	INAT	Utilization of Biomass	20
Chedly LAROUSSI	INAT	Water Management	30
Abdelwahed HAMROUNI	IRA	Computer Science	30
Zoubidi R'HOUMA	ESEPR	Criteria for Evaluating Teaching	30
Naceur HAMZA	INRAT	Breeding of Peppers	25
Dhali BEN SALAH	ESJER	Computer Use in Teaching	30

ANNEX 8: EXAMPLE OF A CURRENT LINKAGES PROJECT

Tunisian Institution: Superior School of Horticulture, Chott Meriem

Tunisian Research Specialist: Dr. Mohamed Ben Khedher

American Research Specialist: Dr. Elmer E. Ewing  
Professor of Horticulture  
Cornell University

Amount of Budget (US): \$10,000

Title of Project: Contribution to the Development and Selection of  
Potato Ideotypes for Tunisian Conditions

Objectives of Project:

The objective is to obtain growth analyses data for potatoes in Tunisia that will permit a better understanding of the nature of varietal differences in ability to tolerate high temperature, and unfavorable photo-periods. Through the use of an explanatory computer model to use this information in predicting cultivar traits that would be best adapted to Tunisian conditions.

Actions Undertaken:

Six potato cultivars (Norchip, Katahadin, Desiree, LT-1, C1-884, and C14-343) were received from the United States as plantlets in test tubes in October 1984. They were increased in test tubes from October 1984 to January 1985, and then increased in the greenhouse from February 1985 to July 1985. They now are being increased in the field and will be harvested by February 1986. They will be planted again in the field by April 1986, as the first trial. We will make observations of how they grow under high temperatures of June.

Actions Planned for the Future:

A proposal is being prepared that would extend the project for two more years to see how the different lines grow under high temperatures in different seasons and in different areas.

Signed: \_\_\_\_\_  
Mohamed Ben Khedher

## ANNEX 9: LINKAGE PROJECTS FUNDED FOR 1984-85

Tunisian Scientist	American Scientist	Research Topic	Amount Budgeted (\$)	Balance as of 9/30/85 (\$)	Comments
Mohamed BEN KHEDHER Hort. Sch. Chott Meriem	Eimer Ewing Cornell University	Selection of Potato Ideotypes	10,000	4,822	An excellent project
Mabrouk MATHLOUTHI Horticulture School Chott Meriem	R.D. Martyn Texas A&M Univ.	Watermelon Improvement	8,000	1,744	Excellent subject for re- search. Tunisian staff need strengthening with plant pathologist
Moncef HARRABI National Agri. Inst.	Eugene Sharp Mon. State Univ.	Development of Disease Resistant Barley	11,000	6,502	An excellent project
Abderrazak DAALOUL National Agri. Inst.	Rollin Sears Kan. State Univ.	Cereal Improvement (Sabbatical leave)	12,700	2,000	An excellent project
Mohsen KAABIA National Agri. Research Institute	T. McCarty University of Missouri	A Field Laboratory for Measuring Soil Erosion under Crop Production	7,900	7,800	Plots being prepared. No visit yet by U.S. specialist
Mohamed FRAJ National Agronomique Research Institute	W. A. Compton University of Nebraska	Genetic Improvement of Local Corn Varieties	8,500	337	Some project activity Tunisian scientist has moved from INRAT to ESEM
All GHARBI	W.R. Walker Utah State University	Effect of Irrigation on Wheat Production	8,000	7,957	First field trial destroyed by severe hailstorm. Plots ready for replanting
Abdessatar OUMEZZINE Hort. Sch. Chott Meriem	M.K. Rogoyski Col. State Univ.	Orchard Floor Mgt. under Fruit Trees	10,000	7,309	Project underway
Mustapha KSONTINI Nat. Forestry Res.Inst.	Thomas C. Hennessey Ok. State Univ.	Nursery Water Mgt.	9,000	4,000	

## ANNEX 10: CONSULTANTS ON THE ATT PROJECT

<u>Year</u>	<u>Name</u>	<u>Specialization</u>	<u>Weeks</u>
1980	Warren Prawl	Administrative	2
	Wayne Collings	Agriculture Library	2
	J. M. Poehlman	Agriculture Library-Scientific Collection	2
	Robert Isaac	Soil Analysis Laboratory	2
1981	Wayne Collings	Agriculture Library	1
1982	William Johnson	Agricultural Machinery	2
	James Gregory	Soil and Water Conservation	2
	Gary Krause	Use of Computer	2
	Robert Isaac	Soil Analysis Laboratory	2
1983	Verna Larson	Relationship of Education, Research and Extension	2
	Wendell McKinsey	Research and Extension	2
	Ray Martin	Plant Pathology	2
	Rick Brandenburg	Pest Management	2
1984	Robert Isaac	Soil Analysis Laboratory	2
1985	Dr. Holmo	Technology of Grapes Processing and Utilization	3

## ANNEX II: CANDIDATES FOR M.S. AND PH.D. DEGREES\*

NAME	DATE OF DEPARTURE	FIELD OF TRAINING	UNIVERSITY	DEGREE(S)	PLANNED ASSIGNMENT**	ACTUAL ASSIGNMENT ON RETURN***
1. Abdelkrim HAMD1	Aug. 1981	Civil Engineering	Oregon State Univ.	Ph.D.	INAT	
2. Chedly HAFI	Aug. 1981	Animal Science	Univ. of Nebraska	Ph.D.	INAT	
3. Essia LABIADH	Aug. 1981	Library Science	Univ. of Missouri	M.A.	INAT	INAT
4. Abderrazak GARGOURI	Aug. 1981	Statistics	Oregon State Univ.	Ph.D.	INAT	
5. Mohamed MERCHERGUI	Aug. 1981	Soil & Water Scs.	Univ. of Cal.-Davis	Ph.D.	INAT	INAT
6. M'Naouar DJEMALI	Jan. 1981	Animal Science	Iowa State Univ.	Ph.D.	INAT	
7. Habib M'NASRIA	June 1982	Food Technology	Colo. State Univ.	Ph.D.	INAT	
8. Netij BEN MECHLIA	Aug. 1979	Bio-Climatology	Univ. of Cal.-Davis	Ph.D.	INAT	INAT
9. Mohamed CHEBAANE	Aug. 1982	Civil Engineering	Colo. State Univ.	Ph.D.	INAT	
10. Sihem BELLAGHA	Aug. 1982	Food Technology	Univ. of Florida	M.S.	INAT	INAT
11. Mohamed Habib SNAME		Agri. Engineering	Univ. of Missouri	Ph.D.	INAT	INAT
12. Brahim TRABELSI	Aug. 1981	Agri. Economics	Iowa State Univ.	Ph.D.	ESH-QM	
13. Abdallah OUMEZZINE	Aug. 1979	Agri. Economics	Univ. of Missouri	M.S.+Ph.D.	ESH-QM	ESH-QM
14. Mongi ZEKRI	Jan. 1980	Horticulture	Univ. of Florida	M.S.+Ph.D.	ESH-QM	
15. Abdessatar OUMEZZINE	Jan. 1981	Horticulture	Colo. State Univ.	M.S.	ESH-QM	ESH-QM
16. Mohamed LIMAM	Aug. 1970	Statistics	Oregon State Univ.	M.S.+Ph.D.	ESH-QM	Saudi Arabia
17. Bechir KACEM	Aug. 1982	Food Technology	Univ. of Florida	Ph.D.	ESH-QM	
18. Mohamed BEN KHEDHER	Aug. 1982	Vegetable Crops	Cornell Univ.	Ph.D.	ESH-QM	
19. Aws ALQUINI	Aug. 1982	Agri + Irr Eng.	Colo. State Univ.	Ph.D.	ESH-QM	
20. Ali Moh. BEJI	Aug. 1979	Statistics	Univ. of Missouri	Ph.D.	INRAT	INRAT
21. Hamdi BEN SALAH	Sept 1981	Agronomy (Crop Production)	Kansas State Univ.	M.S.	INRAT	INRAT
22. Mohamed CHAKROUN	June 1982	Agronomy (Forage Prod.)	Oklahoma State Univ.	M.S.	INRAT	INRAT
23. Mustapha CHELBI	Jan. 1981	Plant Pathology	Univ. of Georgia	M.S.	INRAT	INRAT
24. Mohamed FRAJ	Aug. 1980	Agronomy (Plant Improvement)	Univ. of Nebraska	Ph.D.	INRAT	ESEM
25. Azaiez GHARBI	June 1981	Agronomy (Soil Science)	Univ. of Georgia	Ph.D.	INRAT	ESAK
26. Rachid CHERIF	Jan. 1981	Entomology	Univ. of Georgia	M.S.	INRAT	INRAT
27. Aida KAABIA	Aug. 1980	Library Science	Univ. of Missouri	M.A.	INRAT	INRAT
28. Mohsen KAABIA	Aug. 1980	Agronomy & Agri. Engineering	Univ. of Missouri	M.S.	INRAT	INRAT

NAME	DATE OF DEPARTURE	FIELD OF TRAINING	UNIVERSITY	DEGREE(S)	PLANNED ASSIGNMENT**	ACTUAL ASSIGNMENT ON RETURN***
29. Khemaïs KRAIEM	Sept 1981	Animal Science	Univ. of Minnesota	Ph.D.	INRAT	OEP
30. Tahar ALAOUI	Aug. 1979	Agronomy (Soil Science)	Univ. of Missouri	Ph.D.	ESAK	ESH-OM
31. Moncef BEN HAMOUDA	Aug. 1982	Soil & Water Conservation	Univ. of Arizona	M.S.	ESAK	
32. Mongi BEN YOUNES	Aug. 1980	Agronomy (Plant Improvement)	Univ. of Missouri	M.S.	ESAK	ESAK
33. Mohsen BOUBAKER	Aug. 1981	Agronomy (Plant Improvement)	Univ. of Missouri	M.S.+Ph.D.	ESAK	
34. Mokhtar BOUCHANDIRA	June 1981	Agri. Engineering	Iowa State Univ.	M.S.	ESAK	ESAK
35. Mohamed BOUSLAMA	Aug. 1979	Agronomy(Genetics)	Kansas State Univ.	Ph.D.	ESAK	ESAK
36. Raouf CHERIF	June 1982	Agronomy (Weed Science)	Oregon State Univ.	M.S.	ESAK	
37. Bechir KHELIFI	June 1980	Agri. Economics	Univ. of Missouri	M.S.	ESAK	Central Tunisia Project
38. Ahmed MAROUANI	Jan. 1980	Agronomy (Seed Production)	Washington State University	M.S.	ESAK	ESAK
39. Amor YAHYAOUI	Aug. 1982	Plant Pathology/Genetics	Montana State Univ.	Ph.D.	ESAK	
40. Hichem ACHOUR	Aug. 1982	Irr. Engineering	Univ. of Arizona	M.S.	IRA	
41. Aneur BEN MANSOURA	Aug. 1979	Range Management	Kansas State Univ.	M.S.+Ph.D.	IRA	
42. Hamadi BEN N'CIK	Jan. 1982	Agri. Engineering	Univ. of Arizona	M.S.+Ph.D.	IRA	ESH-OM
43. Ali DALLALI	Aug. 1979	Plant Pathology	Univ. of Missouri	M.S.+Ph.D.	IRA	
44. Saïd Miloud DHIFALLAH	Aug. 1980	Agri. Economics	Univ. of Nebraska	M.S.	IRA	Ecole de Gestion de Sfax
45. Ahmed BEN N'SIR	Jan. 1982	Mechanical Engineering	Univ. of Nebraska	M.S.	ESIER	ESIER
46. Saghaleh LABIADH	June 1980	Agri. Engineering	Univ. of Missouri	Ph.D.	ESIER	**
47. Ali GHARBI	Aug. 1981	Irrig. Engineering	Utah State Univ.	M.S.	ESIER	ESIER
48. Houcine RAHAL	Aug. 1980	Agri. Engineering	Univ. of Nebraska	M.S.	ESIER	ESIER
49. Abdelhakim SAADI	Jan. 1981	Agri. Engineering	Kansas State Univ.	M.S.	ESIER	ESIER
50. Abderrazak SOUISSI	Aug. 1980	Civil Engineering	Univ. of Arizona	M.S.	ESIER	ESIER

NAME	DATE OF DEPARTURE	FIELD OF TRAINING	UNIVERSITY	DEGREE(S)	PLANNED ASSIGNMENT**	ACTUAL ASSIGNMENT ON RETURN***
51. Nejib GUIZANI	Jan. 1979	Food Technology	Univ. of Missouri	M.S.	ESIA	ESIA
52. Abdelmajid MAHJOUB	Jan. 1980	Food Technology	Univ. Nebraska	Ph.D.	ESIA	ESIA
53. Sadok NOUAIGUI	Aug. 1979	Grain Science	Kansas State Univ.	M.S.+Ph.D.	ESIA	
54. Bouali SAIDIA	Jan. 1981	Food Technology	Iowa State Univ.	Ph.D.	ESIA	**
55. Belhassen ABDELKEFI	Aug. 1981	Agri. Economics	Univ. of Missouri	Ph.D.	ESEPR	
56. Abdelhamid ABOULI	June 1980	Agri. Extension and Development	Univ. of Wisconsin	M.S.+Ph.D.	ESEPR	
57. Ali ALOUI	Jan. 1981	Agri. Extension	Univ. of Nebraska	M.S.	DERV	DERV
58. Amel GHARBI	June 1981	Plant Pathology	Univ. of Georgia	M.S.	INRAT	ESAK
59. Hedi ABOULI	Jan. 1981	Animal Nutrition	Univ. of Wisconsin	Ph.D.	ESEM	ESEM
60. Mohsen DEKHILI	June 1982	Agronomy (Forage)	Univ. of Nebraska	M.S.	ESEM	ESEM
61. Mohamed Habib GHALI	Aug. 1980	Agri. Engineering	Univ. of Nebraska	M.S.	CRGR	Lac de Tunis Project
62. Salem HANDI	Jan. 1981	Agri. Engineering	Kansas State Univ.	Ph.D.	CRGR	
63. Akremi BOUJEMMA	Aug. 1980	Animal Genetics	Univ. of Missouri	Ph.D.	ENMV	
64. Abdeljelil GHAM	Jan. 1981	Vet. Medicine	Kansas State Univ.	Ph.D.	ENMV	
65. Moncef BEN MIRAD	Jan. 1981	Animal Science	Kansas State Univ.	Ph.D.	ENMV	
66. Abdelmajid BEN ALYA	Aug. 1980	Forest Entomology	North Carolina Univ.	M.S.	INRF	INRF
67. Mustapha KSON'INI	Jan. 1981	Forestry	Oklahoma State Univ.	M.S.	INRF	INRF
68. Ali KHOUADJA	Aug. 1980	Forestry	Univ. of Missouri	M.S.	INRF	INRF
69. Driss SADOK	Sept 1981	Agri. Economics	Univ. of Illinois	Ph.D.	ESEPR	ESEPR

\* Sixty-nine graduate students will receive a total of 78 M.S. and Ph.D. degrees assuming that the 26 still in the U.S. meet degree requirements.

\*\* MIAC records dated October 21, 1985

\*\*\* ATT Project Director's records, November 21, 1985. Where assignment is, is not shown; participant has not returned.

\*\*\*\* Degree requirements completed but still in the United States as of October 21, 1985.

ANNEX 12: A WALK THROUGH EXPECTED COSTS  
OF TUNISIAN-BASED ENGLISH LANGUAGE TRAINING

The evaluation team considered a variety of Tunisian-based alternatives to the existing bicountry program for teaching English to undergraduate student participants in TT. These alternatives can be classified in diverse ways; but, perhaps, the simplest classification is residential versus nonresidential programs. A residential program can aspire to be a straight substitute for the current program at universities in the United States. (The realism of that aspiration is discussed below.) A nonresidential program cannot aspire to be a straight substitute; that is, it cannot aspire to do the job in one term. The following analysis is an examination of the expected costs of both residential and nonresidential alternatives for an annual cohort of 60 to 80 undergraduate students for TT. (The current number per year is 70 to 80. MUST expects, as the project matures, the number of graduate students to increase, with a resultant decrease in the number of undergraduate students. This possibility is encompassed by the range of 60 to 80.)

A Tunisian-based program, by hypothesis, is to replace the current term of English study at a university in the United States. Such (hypothetical) replacement minimizes the expected cost of English language study in the United States. Indeed, with the abolition of such study, its cost becomes zero. The current cost per student per term of English language study in the United States is about \$4,000 (Source: MUST). Five percent require a second term, but ninety-five percent finish with one term. (In 1985, the exact figures were  $4/69 = 5.8$  and  $65/69 = 94.2\%$ .) The expected cost per student per year is therefore about  $.95(\$4000) + .05(\$4000 + \$4000) = \$4,200$ . The total expected cost of continuing the current practice is consequently in the range of  $60(\$4200) = \$252,000$  to  $80(\$4200) = \$336,000$ . USAID/GOT overhead staffing is not expected to change essentially. MUST, for example, is expected to continue to monitor the progress of students in the United States. Thus \$252,000 to \$336,000 is the expected benefit of a Tunisian-based program of Intensive English.

This benefit/cost analysis is to ascertain if the expected costs are greater than or less than the expected benefit (see above). The expected benefit is a firm figure, as estimates go in benefit/cost analysis. Expected costs, by contrast, are somewhat conjectural because the Tunisian-based programs are somewhat conjectural; specifically, they do not have a track record of operating budgets. Consequently, cost estimates are conservative or understated for each item in the following analysis. This procedure is intended to impart an analytical firmness to the expected costs. The aim is not to overstate the expected cost of any particular item.

This analysis is divided into four parts: (a) general remarks about any replacement program, (b) specific remarks about a residential program, (c) specific remarks about a nonresidential program, and (d) a summary table. Parts (a)-(c) can be regarded as explanatory footnotes to the summary table.

### General Considerations

(1) Tunisian-based programs are not stretched-out versions of the current pre-departure four-to five-week program of Intensive English in Tunisia.

Briefly, the pre-departure program is a summer program, so facilities and faculty are available in the University of Tunis. By contrast, facilities and faculty are preempted by regular instruction in the autumn term (which is the term to be replaced). Furthermore, when compared to a quick introduction, a final finish is likely to require native language speakers (see below).

(2) Tunisian-based programs, by definition, cannot handle the problems associated with culture shock. The current bicountry program handles culture shock, in advance of academic study, in the United States. A Tunisian replacement, therefore, is virtually certain to lead to a higher drop-out rate than the current program; that is, a larger proportion of students can be expected to fail to adjust to academic study in the United States. Since failures scarcely can be spotted before the lapse of at least one term of academic study, the direct cost associated with a student failure is at least the cost of round trip travel plus the cost of one term of academic study. This currently is approximately  $\$1,100 + \$6,000 = \$7,100$ . (This figure varies with the location and tuition of the university attended. \$6000 per term is roughly the current lower limit.) Thus, the expected cost of this item is in the range of  $p(60)(\$7100) = p(\$426,000)$  to  $p(80)(\$7100) = p(\$568,000)$ , where  $p$  is the increase in the drop-out rate, for any program based solely in Tunisia. The value of  $p$  is not zero. A USAID/Tunis internal memorandum suggests that the drop-out rate was very high for undergraduate students in earlier projects, in previous decades. Nevertheless, existing students are high quality, so the value of  $p$  may be less than ten percent. The evaluation team estimates the value of  $p$  to be about five percent with students of existing quality, but this quality can be expected to decline (see below) with a program based solely in Tunisia. The relevant calculation, with  $p = .05$ , yields an expected cost for this item in the range of  $.05(\$426,000) = \$21,300$  to  $.05(\$568,000) = \$28,400$  per year.

(3) The orientation of students and programs is significant for language learning. "The orientation is instrumental in form if, for example, the purposes of language study reflect the more utilitarian value of linguistic achievement, such as getting ahead in one's occupation, and is integrative if, for example, the student is oriented to learn more about the other cultural community." Lambert's factor analysis confirmed that "students with an integrative orientation were more successful in learning . . . than were those with instrumental orientations." (Wallace E. Lambert, Language, Psychology, and Culture, Stanford University Press, 1972, p. 225-226.)

Tunisian-based programs, with their understandable focus on TOEFL, are likely to have an instrumental orientation. English language centers in non-English-speaking foreign countries are virtually forced to focus on TOEFL because their students are required to have a high TOEFL score for university admission in the United States. (Faculty recommendations and local examinations are alternate routes to university admission from English language centers in the United States.) Existing students, by contrast, are

integrative in orientation in their language study in the United States. This integrative approach was manifested in our interviews with students (see main report). Consequently, when learning English in Tunisian-based programs, students can be expected to be less successful than in the present biculture program. This diminution of quality is an expected cost of alternative programs. The evaluation team is unable to estimate it directly.

(4) Both American and Tunisian officials express the hope that TT graduates will return as engineers imbued with the American Style. The mechanisms of acquiring this style are not perfectly known, but there seems to be no substitute for exposure to America and Americans. Tunisian-based programs would reduce the students' undergraduate time in the United States by  $1/13 = .08$  in the case of American universities on the quarter system and by  $1/9 = .11$  in the case of American universities on the semester system, say, on average .10. The postulated missing term of American study is focused on cultural adjustment and integrative learning, among other things (see above). Thus, roughly, a ten percent reduction can be expected in the extent to which the students acquire the American Style.

(5) "Classes and groups must be kept small. The pace slows down if there are more than ten adults . . . to one teacher." (E.V. Gatenby, "Conditions for Success in Language Learning," reprinted in Harold B. Allen and Russell N. Campbell (eds.), Teaching English as a Second Language, 2nd ed., McGraw-Hill, 1972, p. 48.) TT students are adults, so this entails a faculty of six to eight for a Tunisian-based program of English. Perhaps the faculty could be reduced to five to six for 60 to 80 students in TT. This faculty is presumed to be appropriate professionals. If that presumption is not met, a diminution of quality and a prolongation of study can be expected.

What is an appropriate professional? Briefly, an experienced language teacher who speaks without a discernible accent. Non-native speakers are rarely so qualified in any language; for example, most visiting Bolivian and German teachers of English are rated unofficially as Low-Intermediate at the School of Languages and Linguistics at Georgetown University. Furthermore, the evaluation team is aware of few Americans in Tunisia who are experienced teachers of English as a Foreign Language. The evaluation team concludes that the five to six faculty of appropriate professionals must probably be recruited in the United States.

The recruitment of faculty is likely to be not only expensive but also troublesome. The evaluation team considers it unlikely that appropriate professionals can be recruited regularly in sufficient numbers, on a short-term basis. Perhaps rolling contracts of two years (that is, two year contracts that are extended automatically, year-by-year, with adequate performance and program continuation) are optimal.

Salary costs per person per academic year are probably in the neighborhood of \$25,000 for Tunisia. (Saudi Arabia and Kuwait are currently recruiting such professionals with salaries around \$30,000.) Fringe benefits would bring the total per person per academic year to at least \$33,600. (For university faculty, a rule-of-thumb for fringes as a percentage of salary is thirty percent in the United States. But, in addition, other costs are involved for Americans in Tunisia. For example, a minimum of \$1,100 for one round trip by air per year per faculty member must be budgeted.) The expected cost of salaries plus fringes for appropriate faculty per academic year is thus in the range of  $5(\$33,600) = \$168,000$  to  $6(\$33,600) = \$201,600$ . This figure does not include a salary increment for the Director. The exact total is dependent on the academic risks to be undertaken. The risks increase with any decrease in faculty numbers or professional qualifications.

The estimated cost of recruiting ten TESL specialists for Tunisia, by a contractor, is approximately \$55,000. (A detailed estimate, giving breakdowns of that summary figure, has been prepared by Creative Associates, Inc.) A pro rata estimate for five to six TESL specialists is \$27,500 to \$33,000. This expected cost can range from a set-up cost to an annual cost. If appropriate professionals are recruited in contracts for the life-of-the-project, then this recruitment cost is (approximately) a set-up cost. But, if appropriate professionals are recruited on annual contracts, then this recruitment cost is (approximately) an annual cost. A set-up cost is smaller and so is used in this analysis. The expected cost of recruiting faculty is therefore in the neighborhood of  $\$27,500/n$  to  $\$33,000/n$ , where  $n$  is the number of years of the program. American and Tunisian officials speak of the desirability of continuing TT for an extended period--ten years or so was mentioned in several interviews. Thus, annualized, the expected cost of recruiting faculty is \$2,750 to \$3,300.

(6) Tunisian-based programs are less likely to perform on schedule than the current program. The reasons are varied; but, for example, strikes were in progress and classes were disrupted as a consequence, when the evaluation team visited two institutes of the University of Tunis. (The Bourguiba Institute of Living Languages and the Institut Supérieur de Gestion were the two institutes.) These autumn term disruptions are noteworthy inasmuch as the autumn term is the critical term for participant training in English. TT students are expected to (and about ninety-five percent currently do) enroll for academic study in the winter term at universities in the United States. While the evaluation team did not analyze in detail the breakdowns of academe, quick-and-dirty calculations show the empirical frequency of strikes alone is at least five percent. (There are approximately 50 institutes, schools, or faculties in the University of Tunis;  $2/50 = .04$ . ISG was founded in 1969;  $3/16 = .06$ . And  $(.04 + .06)/2 = .05$ .)

## Residential Programs

(7) A Tunisian-based residential program, by hypothesis, is designed to substitute a term in Tunisia for a term in the United States. Currently, about ninety-five percent of the students enroll in academic study after one term of Intensive English in the United States. What percentage can be expected to do so, given a Tunisian-based residential program? For diverse reasons, of which the following are examples, the answer is less than the current percentage. (a) In Tunisia, the environment would virtually force the students, when outside the dormitory or classroom, to speak French or Arabic. (b) From Tunisia, a high TOEFL score would be virtually the only route to admission to academic study in the United States. (c) In Tunisia, the disruption/postponement of classes would be more likely due to, for example, student strikes. (d) The academic quality of participating students is likely to decline somewhat (see below).

The evaluation team can only give a considered opinion: perhaps, on the average, less than fifty percent of the students would be able to enroll for academic study at the beginning of the second term in the United States. We are confident that the percentage who would require a second term would not be small; so, to finish the job, a residential program is likely to require an academic year (not just one term) of staffing and funding.

(8) A residential program is designed for students to live in. Such programs aim to create a "Little America." A dormitory/classroom is required with resident advisors who speak only American English. Such programs entail several direct costs, not mentioned heretofore: the cost of the building complex, the cost of audiovisual and other support materials, the cost of maintaining the students for at least the autumn term, and the salaries of resident advisors. Resident advisors can be in addition to faculty or can be faculty who are paid extra to live in.

(9) The cost of buying buildings to house 60 to 80 students, with ancillary meeting rooms, is prohibitive prima facie. Adequate space for classrooms, language laboratory, and faculty/administrative offices is estimated to have an annual rental value in the range of \$30,000 to \$40,000. (Source: MUST.) Perhaps the annual cost of dormitory space is roughly comparable, such space as an apartment complex on the private market or dormitories at the University of Tunis or the Lycee Pilote (Ariana). The total expected cost is therefore in the range of \$60,000 to \$80,000. (Two dormitories are required, given male and female students and social customs in Tunisia. Female participants are fewer in number and, so, might not occupy an entire dormitory, but they would be disadvantaged unless their dormitory was wholly English speaking. This is a constraint for a residential program.)

(10) Audiovisual materials are a partial substitute for the milieu of the United States. The audiovisual materials required are more extensive than comparable materials in well-equipped language laboratories at universities in the United States. (A laboratory does not replicate a milieu.) American prices are relevant, since such materials are imported into Tunisia, although some standard American equipment may be incompatible with the Tunisian electrical system.

This partial substitute at best is less than perfect. Evening television, for example, is a major source of language learning by Tunisian students in the United States. (Television network news, with its short declarative sentences, nonregional accents, and visual supporting footage is commonly considered to be a major source of language learning by staff at English language centers in the United States. Tunisian students, in our interviews, spontaneously confirmed that professional judgment.)

Such programming cannot be replicated in Tunisia. But it can be approximated with in-house television. The cost of television in the dormitory--e.g., a television set (\$250) with a video cassette recorder (\$350) in each of 40 rooms and a tape library with a few hundred tapes (\$16,000) in the dormitory building--is roughly \$40,000. The annual cost--\$40,000/n, where n is the number of years of the program--is a lower limit in the present context: for example, it ignores the cost of shipping. Continuing to use the ten year figure mentioned above, the expected annual cost of in-house television is about \$4,000.

The set-up cost for a well-equipped language laboratory, with 36 positions to handle 60 to 80 students, is estimated currently at \$65,000 in the United States. The tape duplicator and ancillary equipment are an additional \$10,000. A language laboratory should expect that ten percent of its equipment is malfunctioning, at any given time after the first year, in the United States. Back-up spare parts, on hand, thus should be about ten percent of the initial purchase, an additional \$7,500. (Extreme care should be taken in purchasing equipment; in the opinion of one director of such a laboratory, some of the cheap stuff is "junk.") The annual cost--\$82,500/n, where n is the number of years of the program--is a low limit; for example, it ignores the cost of shipping and the added cost of more extensive materials. Annualized over ten years, the expected cost of the language laboratory is about \$8,250.

The maintenance problems of scientific (particularly imported) equipment are serious in Tunisia. Equipment malfunction was a recurrent complaint in our interviews with researchers and scientists, not least in connection with the Bourguiba Institute of Living Languages. A rule-of-thumb for the annual maintenance budget for a well-equipped language laboratory is ten percent of set-up costs in the United States. With \$65,00 + \$10,000 = \$75,000 of basic equipment, ignoring spare parts, this rule yields an expected cost of \$7,500. Given imported replacement parts and more extensive equipment, including television sets and video cassette recorders, the maintenance cost is not likely to be less in Tunisia.

A modest cost recovery by selling used equipment at the program's end is perhaps possible.

(11) Peace Corps volunteers would be suitable, if available, as resident advisors in the dormitory complex. The cost of a volunteer is about \$20,000 per year in Tunisia. (Peace Corps/Washington informally provided that figure as a rule-of-thumb.) A resident advisor to student ratio of 1/20 suggests a need for at least three to four resident advisors. This number of resident advisors is a low limit since it ignores the constraint imposed by the male/female ratio of participating students. The expected cost of resident advisors is therefore at least in the range of \$60,000 to \$80,000 per year. Perhaps this function could be discharged at less cost via extra pay for some appropriate professional faculty.

(12) Student stipends are TD30 per month at the University of Tunis. This stipend is paid for ten months, and the academic year is two terms. But student stipends are only part of student subsidies by GOT. The actual cost per month is close to TD150. (Source: MUST.) The expected cost of student subsidies for the autumn term is therefore in the range of  $5(60)(TD150) = TD45,000$  to  $5(80)(TD150) = TD60,000$ . Furthermore, if half the students require a second term, the expected cost of student subsidies for the second term is in the range of  $5(30)(TD150) = TD22,500$  to  $5(40)(TD150) = TD30,000$ . These estimates yield a total cost of student subsidies in the range of TD67,500 to TD90,000.  $\$1.00 = TD.75$ , approximately, at the present time, so the annual cost of student subsidies is expected to be \$90,000 to \$120,000.

(13) There is a cost associated with the prospective delay (for some students) in beginning study in the United States. A term's delay in commencing is a term's delay in completing a degree program and, consequently, is roughly a six month delay in returning to productive employment in Tunisia. The cost of delay can be estimated as follows: B.S. engineers, after a year of on-the-job training, can expect to earn a salary of TD450 per month in the private sector or TD300 to TD350 per month in the public sector in Tunisia. (Source: MUST.) American and Tunisian officials express the hope that engineering graduates will concentrate in the private sector. (That is part of the American Style). However, to understate this cost, assume the distribution is 50-50. The manifest cost per delayed student is therefore about  $6\left[\frac{450 + 300}{2}\right] = TD2,250$ . But, on average, the real cost is greater: presumably, for example, the engineer is worth at least the salary paid and, in a sense, our concern is with an average six months in the engineer's career. These factors can be accommodated somewhat by following the practice of engineering firms who mark-up staff salaries on consulting contracts by multiples of 2.5 or 3. The real cost per delayed student is therefore between  $2.5(TD2,250) = TD5,625$  and  $3(TD2,250) = TD6,750$ . The total annual cost of this item is thus in the range of  $1(60)(TD5,625)$  to  $q(80)(TD6,750)$ , where  $q$  is the increase in the proportion of students who are not admitted for academic study after one term of Intensive English. The value of  $q$  is perhaps in the neighborhood of one-half (see above). Consequently, for a residential program, the annual expected cost of delayed students may be in the range of TD168,750 to TD270,000 or, at the present rate of exchange, \$225,000 to \$360,000.

## Nonresidential Programs

(14) A nonresidential program can do the job in an academic year. "With three or four hours a day [and a faculty/student ratio of  $1/10$ ] . . . adults may become proficient in speech in less than a [calendar] year." (Gatenby, op. cit., p. 48.)

(15) The expected costs of a nonresidential program do not include the resident advisors, in-house television, and dormitory as distinct from classrooms, of the residential alternative. However, for a nonresidential program, the expected costs of student stipends and of delayed employment are increased substantially ( $q$  would be about .9). (Despite appearances, the value of  $q$  is not 1 (i.e., 100 percent). For example, although a nonresidential program is designed for a full academic year, a few exceptional students can be expected to achieve a sufficiently high TOEFL score at the end of one academic term.)

The expected costs of professional faculty, language laboratory, and equipment repair/replacement are essentially the same for nonresidential and residential programs. With more extensive equipment, the actual cost of repair and replacement is likely to be greater for a residential program. But, since this analysis uses conservative or understated estimates, only the maintenance budget of a language laboratory is counted for either program.

(16) The expected costs are as follows for the variant items of a nonresidential program: audiovisual materials (language laboratory sans in-house television), \$15,750; student subsidies, where  $q = .9$ ,  $5(60)(TD150) + 5(.9)(60)(TD150) = TD89,500$  to  $5(80)(TD150) + 5(.9)(60)(TD150) = TD114,000$  or, at the present rate of exchange, \$114,000 to \$152,000; delayed employment, \$405,000 to \$648,000; classroom space, \$30,000 to \$40,000.

## General Consideration

(17) The delayed employment to be expected on average with both residential and nonresidential programs is likely to cause some deterioration in the academic quality of participating students. Current students are quite aware of their "lost" term of English language study in the United States. (The term does not count towards a degree, so it is "lost.") With Tunisian-based programs, a "lost" year is a manifest possibility. Since French is the language of instruction in the math-science track of the secondary schools from which participants are recruited, there is no language barrier to study in France. The best students, as a consequence, may choose to go to France rather than the United States. This potential diminution of quality is an expected cost of nonresidential and residential programs, but the evaluation team is unable to estimate it directly.

The following table is a composite summary of the foregoing analysis of annual costs in current prices. No effort is made to estimate the distribution of costs with respect to the affected parties; USAID, GOI, etc.

**Summary Table of Benefits & Costs of Tunisian-Based English Language Training**

<u>Annual Costs</u>	<u>Residential</u>	<u>Nonresidential</u>
Academic Failure Increase, (2)	\$21,300-\$28,400	\$21,300-\$28,400
English Fluency Reduction, (3)	Not Quantified	Not Quantified
American Style Diminution, (4)	Not Quantified	Not Quantified
Professional Faculty, (5)	\$168,000-\$201,600	\$168,000-\$201,600-
Faculty Recruitment, (5)	\$2,750-\$3,300	\$2,750-\$3,300
Dormitory/Classroom, (9, 16)	\$60,000-\$80,000	\$30,000-\$40,000
Dormitory Television, (10)	\$4,000	Not Applicable
Language Laboratory, (10, 16)	\$19,750	\$15,750
Resident Advisors, (11)	\$60,000-\$80,000	Not Applicable
Student Subsidies, (12, 16)	\$90,000-\$120,00	\$114,000-\$152,000
Employment Delay, (13, 16)	\$225,000-\$360,000	\$405,000-\$648,000
Participant Quality Decline, (17)	Not Quantified	Not Quantified
Total Annual Cost	<u>\$650,800-\$897,050</u>	<u>\$756,800-\$1,089,050</u>
<u>Annual Benefits</u>		
Terminate English in USA	\$252,000-\$336,000	\$252,000-\$336,000
Annual Program Increase (net)	<u>\$314,800-\$645,050</u>	<u>\$420,800-\$837,050</u>