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Malta

In-Depth Assessment in Two Potential "Centres of Excellence"

SF/MAR/84/001/11-01/51.5.A

TECHNICAL REPORT

Prepared for the Government of Malta
by the United Nations Industrial Development Organization, executing agency for the United Nations Development Programme

Based on the work of the Industrial Training Advisor

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3639

United Nations Industrial Development Organization

Vienna

1. INTRODUCTION

1.1. My work for the Republik of Malta commenced on 12. February and terminated on 27. March, 1985.

On 13. February I had a first appointment in the Co-vernment-Building (Castille) in Valletta, the capitol of Malta, with Mr. Fiorini Lowel, Secretary to the Minister of Education and Mr. Fearne, Secretary to the Director of Education.

With these Co-vernment officials I discussed my UNIDO - job - description and explained how I intended to handle my assignment.

1.2. First I stayed at the Fellenberg Institute in Paola and had an initial interview with Mr. Lawrence D. Zammit, Head of the school.

In answer to my request he handed me a list of the teaching staff, the Syllabus and the time-tables for the four years of trainingrhythm.
We discussed the teaching subjects of the Syllabus.

The Fellenberg - Institute educates Technicians for Industrial - Electronics.

After an in - depth - assessment of the facilities and equipment of the Institute, I concentrated on the actual teaching.
In order to gain a thorough insight into the training process, the teaching subjects and the training standard, I attended the lectures of the individual teachers and observed the practical training of the students.

In so doing I used the time tables as a guide.

I examined the handwritten records of the teachers and the students notes and after the lectures I discussed their problems with teachers and students.

Likewise I watched the practical training in the laboratories to gain a general impression of the utilization of the equipment.

I concluded my activities at the Fellenberg Institute with a lecture:

"Introduction to the Theory of
High (Radio) - Frequenzy - Lines"

to gain an impression of the fourth-year trainees' standard.

After completing my information material for the Fellenberg Institute, I changed over to the Naxxar Technical Institute.

2.1. At the Naxxar Technical Institute, which trains engineering technicians, car mechanics and automotive electricians, I contacted first of all the Head of the school Mr. George Vella and Mr. Joseph Zahra, Head of the Technical Department.

After an intensive introduction to the school's facilities, I started attending the lectures, following a previously agreed schedule.

I not only observed the technicians' courses, which may be developed into a "Centre of Excellence" but also the other, lower courses, in order to familiarize myself with the initial and intermediate training of the would-be technicians, placing special emphasis on the practical training in the laboratories.

3.1. After completing my information on the Naxxar Technical Institute, I discussed with Mr. Fearne, Mr. Fiorini Lowel and Mr. Morris Abela, the Secretary of the Prime Minister, the pcsibilities of realiziation of the "Centres of Excellence".

These conferences gave me an opportunity to report on my findings at both institutes, while the Go-vernment officials made proposals to expand the schools and eliminate shortcomings.

4.1. During my stay on Malta, I took every opportunity to visit Maltese - industrial firms and other institutions, where graduates of the Fellenberg Institue or the Naxxar Technical Institute are employed.

I surveyed their jobs and conducted discussions with both the technicians and the management of the firms.

4.2. Visits to Maltese institutions and industries:

Power Station
Brands International LTD
Farsons Brewery
Malta Dock Yard
University of Malta
Deutsche Welle Malta
Telemalta

5.1. I wrote a provisional report and left behind two copies for the Go-vernment of Malta.

My assignment as Industrial Training Advisor in Malta terminated on 27. March 1985.

In-Depth Assessment in Two Potential
"Centres of Excellence"

RP/MAT/84/001/11-01/31.5.A

TECHNICAL REPORT

I. FELLENBERG TRAINING CENTRE FOR INDUSTRIAL ELECTRONICS (FTC)

1.1.1. History: see Appendix No. 1

1.1.2. Type of training offered:

FTC offers an Industrial Electronis course for technicians.
One course has a duration of 4 years.
Capacity: 18 students are admitted every six month
therefore, 18 . 4 = 72 students would be the ideal standard.
The current loss rate is about 3 per year
therefore 63 students are at FTC now.
(This is the average value)

For the first two years the training consists of lectures with practical training.
The last two years they alternate between theory at school and practical work in Malta factories
(The students receive LM 15 per week from the Go-vernment).

The level is technician level, but is confined to Industrial electronics.
The "incomplete" Diploma is therefore not recognized by countries other than Malta.

The trainees need as entry qualification:

"O" - Levels in physics and mathematics.

During the first two years the training consists of lectures and practical work:

1. Electronics laboratory
2. Mechanical practice
   Basic skills, such as drilling, lathing, a.s.o.

See : Appendix No. 2
Extended Skill Training Scheme
Course Schedule

Appendix No. 3
Course run at this Centre
(Own table of FTC)

Appendix No. 4
Syllabus of all four years

Appendix No. 5
Example of time table

Appendix No. 6
Job Opportunities

1.1.3. Staff and Skills Composition

The FTC staff comprises ten teachers including the Head.
All teachers are full-time teachers.

Age of teachers: Between 30 and 45
Qualification : Four BSc's the other teachers have lower qualifications.

See : Appendix No. 7
List of teaching staff
Qualifications and Teaching Subjects

The sujects taught can be compared with technician level.

1.1.4. Methodologies and Work Routines

During my assessment of lectures, I noticed the following:
The main problems are

a. Typical weakness in answer processing.
b. No constant flow of information during the lessons.
c. No use in made of simple aids like coloured chalk.
d. Standardized formulas are not generelly used; so when they are, they are not clearly defined for the students (e.g.: unit equations).
e. No use of demonstration equipment during lectures.

Therefore some teachers needs some training in methodology and teaching-techniques.
Some of the teachers display, however, plenty of teaching expierience and meet all requirements.

Some teachers consider the time for preparing the lectures as too short.
The average time for teaching is 32 lessons per week which exceeds the teaching time e.g. in Germany by about 8 lessons per week.

For the current subjects of teaching the handouts for the students are fully satisfactory.
The teachers have their own handwritten ore typed papers, prepared by themselves.

There are a few demonstration possibilities for oszillators or multivibrators (PEM), but they are kept in storage and not used.
But even if they were being used, they would not meet the requirements.

For engineering science, e.g. no demonstration material exists.

The institute has two overhead projectors, which are very rarely used.

Lecture Techniques:

During the lectures most teachers present their subjects mostly by reading from their own teaching guides. The students are not actively envolved, exept when they have questions.
Lessons are not begun and finished in accordiance with the time table.
The students do not prepare their own notes on the sujects taught. Instead they are dictated by the teacher.
Questions and answer games are very rarely used.

Repetition and Revision:

A decisive factor for a student's success or failure is repetition or, before examinations, the revisions.
These are mostly practiced by the teachers in the following way:
The problem is written on the blackboard or dictated by the teacher. Then the students attempt a solution on their own.
The solution is not always dicussed at the end of the lesson.

Practical Training:

During the practical training (electronics) in last two years the students are mostly left to their own resources.
Therefore the time required for each problem is comperatively long.
But teachers are generally available to help.

The mechanical training is very good and of high standard.
These lessons are very well prepared.

Examinations:

The level of examinations and tests corresponds fully to the subjects of teaching.

See: Aprendix No. 8
Examination: Electrical Technology

1.1.5. Premises and Facilities

Even how the existing facilities are rather small and therefore hardly meet the requirements.

Currently being used are:

Offices:

1 room for Head-Master
1 room for secretary and office equipment
1 room for all teachers, which is absolutely too small

Reference libary:

Only the few books available in the Headmaster's and in the teachers' office canbe used by the students.

Classrooms:

One drawing-room, which is equipped with 18 drwing-boards. These are in an adequate condition. The entire equipment including the blackboard is comperatively old.

Note: It is worth considering whether the blackboards and the entire furniture in the classrooms should be replaced.

One lecture-room for theory, equipped for 18 students. The blackboard is too small and there are no possibilities for practical demonstrations during the lessons.

One lecture-room, which is also used as a laboratory, has 18 workbenches suitable for practical electronics training.
All measuring stations are equipped with 220 Volt sockets.

One lecture-room and laboratory for 18 students to conduct lectures and solve practical problems.

One laboratory-room for practical work in mechanical engineering.
The facility is well equipped with enough stations for the students.
The machinery available comprises:

4 lathes
3 drilling machines
1 hacksaw machine
sheet metal machines
2 types of shering machines

as well as a number of other smaller items.

See: Appendix No. 1
Workshop: Mechanical training

One store-room where all electronical training equipment is kept.

1.1.6. Equipment and Supplies

The electronics labs can be equipped, depending on the subjects being taught with the following items, which are stored in the room mentioned under 1.1.5.

See: Appendix No. 9

The entire equipment should be overhauled as far as calibration and general condition are concerned.

Many of the electronic plugs and sockets (connectors) are corroded and cause connection problems during practical training.

According to the responsible teacher in charge, the first year students work only one practical project. This includes a relay circurity with cable installation and soldering training.
All other problems are handled with the "Fischer Boxes"-

There is only one Technician who is responsible for the maintenance of the electronic equipment; therefore most of the technical work is done by the teachers.
The equipment and the store of expendable materials like integrated components and other electronic parts are satisfactory.

A video recorder is available, but video tapes are in German and therefore need translating.

See: Appendix No. 10
List of videos

1.1.7. Industries Served and Wags and Means of Contacting them

In the third and fourth years of training the students are assigned to several firm in the country. Therefore it is not necessary to develope a special contact to industry for the students benefit.

See: Appendix No. 6

1.1.8 Management and Financing

The Headmaster of school Mr. Lawrence D. Zammit is responsible for all occurrences at the institute.

He is subordinated to the Department of Education.

He is responsible for the efficiency of education, the observance of the syllabus during the running training and the time table.

The administrative staff consists of:

1 secretary
1 technician (equipment store)
1 caretaker

The institute is financed by the Go-vernement of Malta.
The amount of financing is adequate to the education mission.

1.2. Additional Inputs for the "Centres of Excellence"

1.2.1. Proposed Inputs to the Go-vernment of Malta

The training and teaching system should not be changed.
A second floor and therefore certain equipment for the training of additional students is required.

The Go-vernment of Malta would be ready to arrange for that.
The Go-vernment would be able to provide six engineers, who are currently being trained at the University of Malta:

4 Electrical or electronic engineers
2 Mechanical engineers.

Upon completion of their training these teachers would be about 24 years of age.

1.2.2. The trainees of other countries should not be separated from the Maltese trainees.
Integration is recommended.

The students should live with Maltese families in their flats or houses, to prevent social isolation.

It is expected that a variable number of students will come from foreign countries.
These treinees should be familiar with the English language and should meet same entrance requirements as the Maltese students.

Lessons will be conducted in English.

Facilities for practical training could be provided by the Maltese Go-vernment, so that foreigners will receive the same practical training as the Maltese students.

1.2.3. According to the Maltese authorities a canteen does not appear to be necessary, because the Maltese people are so close together and the bus-connections are frequent and inexpensive.
However, a canteen seems advisable is recommended.

1.2.4. The libary of the Paola Institute might be used by the Fellenberg students.
This could be arranged by Maltese authorities.

1.3. Recommendations

Proposed Inputs to UNIDO

1.3.1. New subjects which should be introduced

a). Control and Automatic Control Engineering:

Owing to the rapid changer in modern technologies, a rapid development of technicians training is necessary.
Due to the fact that much of the equipment which is used by Malta industries applies control circurity it appears necessary to introduce the subject of

Control and Automatic Control Engineering.

It is proposed that this subject should start in the third year and should be taught throughout in the third and fourth years.

For this new subject the following syllabus is proposed:

See: page 11

Proposed syllabus: Control and Automatic Control Engineering

Third year: 3 periods per week

Fourth year: 2 periods per week

1. Knowledge about fundamentals of control and automatic control engineering

1.1. Definitions
(Blockdiagram of automatic controlled system and open loop system)

1.2. Interconnexion of control loop members

2. Knowledge about the properties of controlled systems; Capability to measure their time response

2.1. Statical properties (linearization)

2.2. Dynamic properties (transfer function, frequency response)

3. Knowledge about the properties of control loops; Capability to measure their time response

3.1. Continuous regulators without and with feedback

3.2. Discontinuous regulators

4. Knowledge about composition of control loop members; Capability to examinate simple control loops

4.1. Stability examinations

4.2. Settings

4.3. regulations; follower controls; multiple controls

5. Knowledge about contact controlled control units; Capability to design simple circuits

5.1. Modules
(Relays, operating relays, contactors e.s.o.)

5.2. Control-circuit and power-circiut

5.3. Control modules e.g.: star and delta connexion, changing the sense of rotation, rotational speed regulation

6. Knowledge about solid state control units; Capability to design simple circiuts

6.1. Implementation of logic functions like:
AND OR NOT NAND NOR

6.2. Temporal limited an unlimited memories

6.3. Counter and register modules

6.4. Examples:

Set-value control
Sequential control
temporal control

7. Knowledge about programme control

7.1. Programming of a control unit

b). A technician of a certain comparable standard should also be introduced to the fundamentals and certain applications of AF (Audio-frequenzy) and HF (High or Radio-frequenzy) - line theory as well as antennas and wave propagation.

The actual Syllabus includes Oszillators, Fundamentals of Receivers and Transmitters but it is felt that a knowlegde how electrical, especially HF energy is conducted to the antenna and radiated without reflections into the atmosphere, is required.
Therefore the following time table and syllabus for that proposed subject would be necessary:

See: page 13

c). Further it is proposed that within the subject of Technical Drawing, both Standard Script and drawing in ink should be generally introduced.

d). During the practical training in electronics for the first and second year it seems to be necessary that in addition to the teacher one or two laboratory assistants should be present to monitor the trainees.

Proposed Syllabus: Radio Frequency Lines

Third year: 4 periods per week

Forth year: 4 periods per week

1. Function

1.1. RF - Line Theory

1.2. The Charcteristc Impedance of a Loss-less Line

1.3. Voltage and Current Changes Moving along the Line

2. Reflection

2.1. Reflection from Short and Open Circiut

2.2. Reflection of AC - Voltages

3. Standing Waves

3.1. Termination in Zo

3.2. Termination: Open Circiut

3.3. Termination: Short Circiut

3.4. Termination with R_L smaller or larger than Zo

4. Applications

4.1. Resonant - Cavities

4.2. Tuned Circiuts

4.3. Introduction to Waveguide Theory

5. Special RF - Oscillators

5.1. Klystron

5.2. Magnetron

5.3. Travelling Wave Tube

6. Antennas

6.1. Feeding

6.2. Radiation Fields

6.3. Antenna Arrays

7. AF - Line Theory

7.1. Characteristic Impedance of AF line

7.2. Moving of Voltage and Current along the Line

7.3. Reflections

7.4. Standing Waves

8. Fundamentals of Wave Propagation

8.1. Propagation of Radio Waves into the space and their behavior

e). It is proposed that "Solid State" should be introduced as a teaching subject.

1. SYLLABUS FOR SOLID TRAINING COURSES AT THE FTC OR A SPECIAL SOLID STATE INSTITUTION

1.1. Contents

1.1.1. Chip production
- etching
- photoprocesses
- raw-material
- material processing
- design

1.1.2. Chip testing
- quality control
- quality improvement
- quality testing

1.1.3. Circurity of Chips
- analog (samples)
- digital (samples)
- high digital (samples)

1.1.4. Treatment
- MOS - circiuts
- Standard circiuts

1.1.5. Basis for application
- some applications (on samples)

2. Material required

2.1. Testing material
- AV - aids (Audi - Visuals)
- films — SGS ?
- drawings — Theory

2.2. Testequipment (practical)
Standardirized testsets like oscilloscopes, generators, logic analyzers.
Details may be obtained from AETW
(per station ca. 2000 £ ≙ $ 5600)

2.3. Expendable Materials (practice)

chips
electronic components
boards
solder, etc.

Details may be obtained from AETW central-storage,
overall cost ca. 1000 £M ≙ $ 2800

1.3.2. Necessary Equipment

a). Engineering Science

For demonstrating the fundamental laws of science special equipment is needes during these lectures.

A possible supplier for these items is:

Fa.
Leybold - Heraeus GmbH
Bonnerstraße 504
D - 5000 Köln
FRG

b). Control and Automatic Control Engineering

For control and automatic control engineering an analog - computer is required.
A y-t recording apparatus is available at FTC. Therefore demonstrations can be carried out during the lectures.
For students engaged in practical work is should be possible to use these materials and sets which are already available (OP's, scopes, conductor plates a.s.o.).
However, an improvement is felt to be necessary since the current equipment lacks both number and variety.
For a possible supplier for these items:
Fa. Leybold
(12 sets for students training)

c). HF and AF Line Theory

For demonstrating the impedance of a Audio-Frequency - Line a special measuring - bridge and an artificial Audio - Frequency - Line is required. (Or, e.g. a cable-reel of Telemalta)

This method is insufficient for high frequencies therefore a "Lecher Line" should be obtained.

For possible supplier, also for all equipment required for fundamental HF - technique
see: a). Fa. Leybold

d). Electrical Machines

This subject of teaching is mentioned in the syllabus of FTC.
However, practical work with these generators and motors is hardly possible due to a lack of equipment.
According to a conversation with the Maltese Authorities an arrangement with the Paola Technical Institute can be achieved.

1.3.3. Staff improvement

As mentioned in chapter 1.2.1. six engineers will be employed by the Government of Malta.
These people are now students of the University of Malta.
Therefore it should be rather easy, for one of these to teach Mr. Kianica's subjects whose contract will run out in a few month.
Referring to the remaining subjects it that possible, that a short gap will occur.
If there is no possibility of employing a Maltese national, these subjects can be taught by

Mr. Hohoff,

if required.

Furthermore the staff should be offered refresher training in methodology of teaching.

Following a proposal of the Headmaster of FTC, an exchange of teachers with other countries for the pupose of widening their knowledge is advisable.

1.4. UNIDO Inputs:

ACTION PLAN

1.4.1. Training in Methodology

First it is necessary to train the teachers in methodology and teaching - techniques.

It is proposed that:

One UNIDO - expert be sent to Malta for about 4 weeks to train the teachers in this subject. (refreshing)

1.4.2. Equipment

As a next step the institute could be provided with the recommended equipment, especially for the new subjects.
(Supposition: second floor for FTC)

1.4.3. Introduction of the proposed teaching subjects

After the Institute has been equipped with the new demonstration and laboratory equipment it seems to be necessary to send an UNIDO - expert for about 8 weeks to FTC, who is able to introduce the new subjects and to familiar the teachers of FTC with the application and use the new equipment.

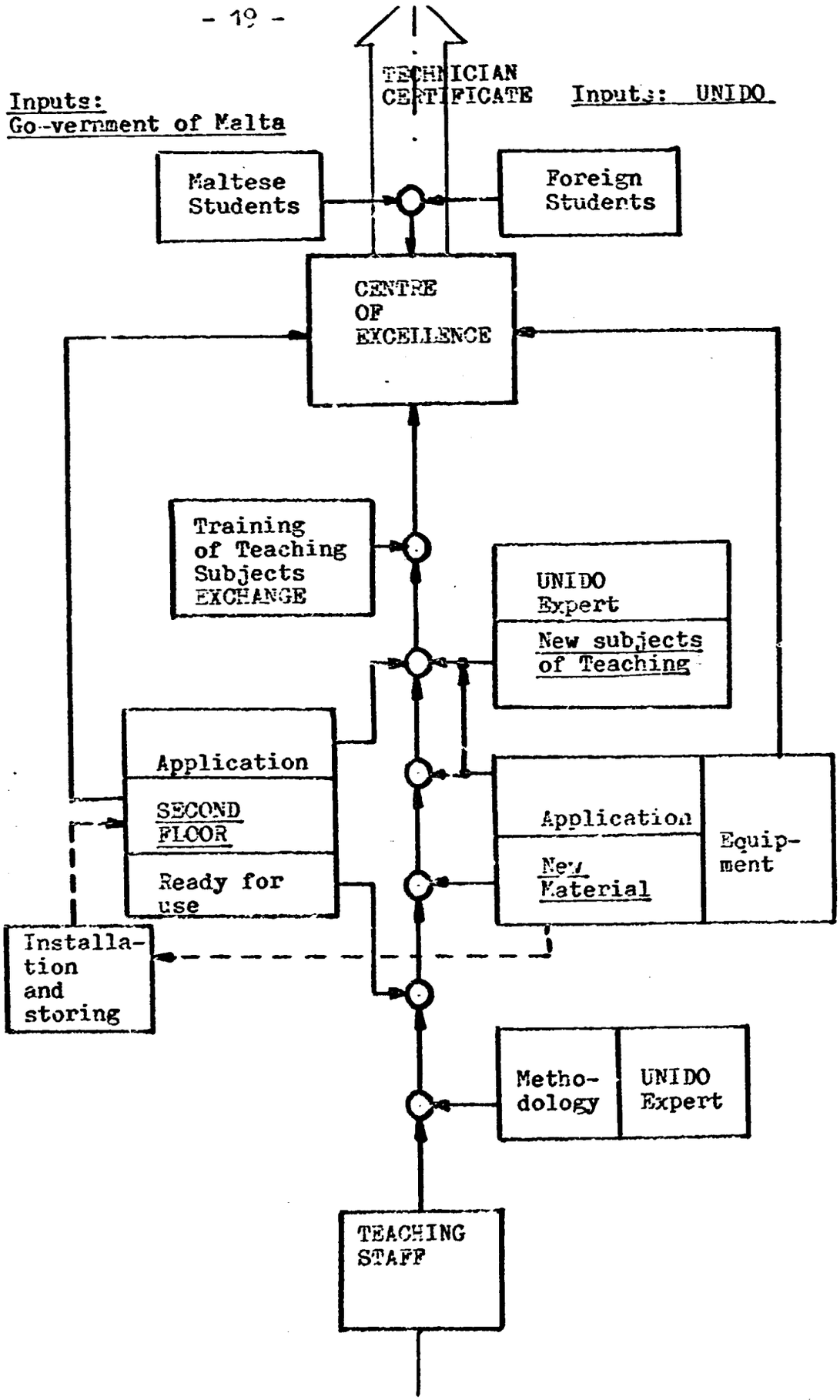
1.4.4. Training of teachers in their teaching subjects

When the teachers have completed their training

in methodology and the introduction to the new subjects, they should be ready to paticipate in the exchange scheme as proposed in 1.3.3. last chapter.

This should be arranged by the Government of Malta.

See: Action Plan page 19



ACTION PLAN FOR TELLENBERG INSTITUTE

In-Depth Assessment in Two Potential
"Centres of Excellence"

RP/MAT/84/001/11-01/31.5.A

TECHNICAL REPORT

II. NAXXAR TECHNICAL INSTITUTE

2.1.1. Type of training offered:

The Technical Institue at Naxxar offers three courses, which are of interest according to the foundation regulation of the "Centres of Excellence".

a). Marine Engineering Technical Diploma (METD)
b). Higher Technician Level (HTD)
c). Ordinary Technician Level (OTD)

All courses have a duration of two years, and they are full - time courses.

The level of the courses corresponds to technician level and offers a very good standard. The Diplomas are recognized by all Commonwealth countries.
The trainees are all sponsored by industries like Sea Malta, Malta Dry Docks, and Malta Shipbuilding Company.

To be admitted to study for Ordinary Technician the trainees must have Pre - Technician level.
For the above courses No. a). and No. b). Ordinary Technician level is necessary.

The practical work is done during the summer holidays.

During the in-depth assessment at Naxxar, the following numbers of students were counted in the HTD - courses:

1 st year : 9 students
2 nd year : 7 students

In OTD - courses:

1 st year	:	12 students
2 nd year	:	10 students
Sum	:	38 students (4 dropped out)

There was no Marine Engineering - course in progress at the time.

Syllabus of Marine - course and HTD - Level is shown in Appendices No. 1 and No. 2
Appendix No. 3
List of students METD and employments

2.1.2. Staff and Skills Composition

The teachers who are mentioned in the list of teaching staff have full - time jobs with the exception of Mr. Debattista (chief engineer of Parsons Brewery) and Mr. Pace (Power Station), who are only present for special lessons.
Both hold Bachellors' degrees.

See: Appendix No. 4
List of teachers

2.1.3. Methodologies and Work Routines

During my assessment of lectures I noticed the following:

The main Problems are as specified:

a. Typical weakness in answer processing.
b. No standardized formulars being used, if so, they are not clearly defined for the students (e.g.: unit equations).

I found out, that the lectures are very well prepared although I found in one case that the whole subject matter for one period had already been completed on the blackboard even before the lecture started.

The teachers use coloured chalk as well as demonstration material.
Some of the teachers have amassed a great deal of experience (including some gained abroad) and meet all requirements.

However, the teaching of some of them suffered from the weaknesses mentioned above, and so an improvement procedure is recommendable.

The teachers are aged between 30 and 60 years.
Most of them have had more than 15 years of teaching experience.

A list of the lessons I attended can be found in

Appendix No.5

Practical Training:

The practical training at Naxxar Technical Institute shows an exellent level.
During the practical training, the students are monitored, supported and advised by the teacher and a laboratory assistant, who is also responsible for the training equipment.
In some subjects the institute operates with the University of Malta (electronic training) and the Institute of Paola (electrical machines) where these Laboratory work ist carried out.

The students of HTD complete their practice during the summer holidays in Maltese industrial enterprises.

See: Appendix No. 3

2.1.4. Examinations

The level of examinations and tests corresponds fully to the subjects taught.
All examinations are submitted beforehand to the "CITY and GUILD" of London Institue (T.C = Technician Education).

2.1.5. Premises and Facilities

The present facilities are excellent.

At the moment the following are being used:

The number of offices for Headmaster, staff and secretary and office equipment is more than sufficient.

The Naxxar Institute libary is equipped with the necessary technical literature, although some volumes especially technical periodicals, are absolete and should be replaced by new ones.

13 lecture - roors are equipped for 20 - 22 students each.
The entire furniture including the blackboards is comperative old.

One drawing - room with 24 drawing boards.

Workshop and Practice Rooms:

See: Report page 5 and 6

Large store - rooms which contain sufficient material used by the students during practical training.
Rooms are already present for a large canteen, which could easily be installed if required.

2.1.6. Equipment and Supplies:

The labs are very well equipped (page 5 and 6).
The entire equipment is generally well maintained and therefore in a good condition.
The supply of treining materials for the labs causes no problems.

A video recorder is not available.

TECHNICAL INSTITUTE HAMAR HALTA ENGINEERING DEPARTMENT

WORKSHOPS AND LABORATORIES

1. Motor Vehicle Workshop. Floor area 25 x 12 metres. Includes a pit and two store rooms. Equipment comprises one four-post lift; heavy lifting gear; wheel balancing; cylinder reboring and honing; drilling and off-hand grinding; individual student tool sets for 20 students at a time; some engines and transmission systems; one land Rover and one Renault 16 car; Can take two or three cars for repair at a time.

2. Diesel Pump Room. 4 x 2½ metres. Equipment includes a Hartridge 800 Phasing and Calibrating machine with accessories to take both in-line and distributor pumps. Also equipment for reconditioning, setting and testing of injectors.

3. Engine Overhaul Workshop. 12 x 12 metres. One 30 ton hydraulic press. Three test beds. Two work benches. A large number of engines of various powers and makes. One store room with individual student tool sets.

4. Welding Workshop. 12 x 10 metres. Six electric arc welding sets. One automatic oxy-acetylene cutter. One power hacksaw. One heavy duty pillar grinder. One bench type drilling machine. One store room with accessories for about 15 students.

5. Machine Shop. Six lathes of 140mm centre height. Three lathes of 155mm centre height and One lathe of 190mm centre height. One Universal Milling Machine equipped with a dividing head. One tool and cutter grinder. One shaping machine. One bench type drilling machine and one Pillar type drill of 45mm capacity. One bench grinder for lathe tools.

6. Bench Fitting Workshops. 2 in number. Complete with work benches, engineers vices, calipers, micrometers, verniers, marking tools, files, chisels hammers etc. Each workshop can take 20 students.

7. Engineering Laboratory. Floor area 12 x 10 metres.
Equipment: four in number engine test sets including four cylinder petrol engine, rotary engine and diesel engine, each coupled to its own dynamometer and having its own instrumentation.
One electrical test bench for dynamos, alternators and starter motors. One ignition distributor tester.
Electric Furnace.

8. Physics Laboratory. Equipment for experiments in mechanics, heat and electricity up to ordinary level standard. Can accomodate 20 students at one time.

2.1.7. Industries Served and Wags and Means of Contacting them

Contacts to Maltese Industry are good, due to the volunteering and visiting of Maltese firms. (plus part - time teachers, who are shared with Maltese firm for some periods)

2.1.8. Management and Financing

Head of the Institute is Mr. George Vella.
He is responsible for all occurrences at the whole institute.
He is subordinated to the Department of Education.

He is responsible for the efficiency of education, the observance of the syllabus during the running training for all courses (Appendix No. 5) and the time table.

Responsilbe for the engineering department of the Institute is Mr. Joseph Zahra.
He is also the Headmaster of all engineering workshops and laboratories.

The administrative staff (engineering department - "Centre of Excellence") consists of:

For each workshop or laboratory there is one laboratory assistent.

The institue is financed by the Go-vernment of Malta.
The amount of financing is adequate to the education mission.

2.2. Additional Inputs for "Centre of Excellence"

2.2.1. Proposed Inputs to the Government of Malta

The teaching and training system should not be changed.
Rooms and staff are sufficient and therefore need not be expanded.
Some experience has been gained with foreign students from Africa.

Supplement of the Maltese authorities:
The practical experience for the students should be increased.
This could be arranged by the Government.

2.2.2. The trainees of other countries should not be separated from the Maltese trainees.
Integration is recommended.

The students should live with Maltese families in their flats or houses, to prevent social isolation.

It is expected that a vorialbe number of students will come from foreign countries.
These trainees should be familiar with the English language and should meet same entrance requirements as the Maltese students.

Lessons will be conducted in English.

Facilities for practical training could be provided by the Maltese Government, so that foreigners will receive the same practical training as the Maltese students.

Proposed syllabus: Control and Automatic Control Engineering

First year: 2 periods per week

Second year : 3 periods per week

1. Knowledge about fundamentals of control and automatic control engineering

1.1. Definitions
(Blockdiagram of automatic controlled system and open loop system)

1.2. Interconnexion of control loop members

2. Knowledge about the properties of controlled systems; Capability to measure their time response

2.1. Statical properties (linearization)

2.2. Dynamic properties (transfer function, frequency response)

3. Knowledge about the properties of control loops; Capability to measure their time response

3.1. Continuous regulators without and with feedback

3.2. Discontinuous regulators

4. Knowledge about composition of control loop members; Capability to examinate simple control loops

4.1. Stability examinations

4.2. Settings

4.3. regulations; follower controls; multiple controls

5. Knowledge about contact controlled control units; Capability to design simple circuits

5.1. Modules
(Relays, operating relays, contactors a.s.o.)

5.2. Control-circuit and power-circiut

5.3. Control modules e.g.: star and delta connexion, changing the sense of rotation, rotational speed regulation

6. Knowledge about solid state control units; Capability to design simple circiuts

6.1. Implementation of logic functions like:
AND OR NOT NAND NOR

6.2. Temporal limited an unlimited memories

6.3. Counter and register modules

6.4. Examples:

Set-value control
Sequential control
temporal control

7. Knowledge about programme control

7.1. Programming of a control unit

b). In connection with the subject of teaching Fundamentals of Electronics, Electricity and Semiconductors it seems to be advantageous to equip the Institute with training and demonstration material (METD).

See: a). Fa. Leybold

c). For all engineering students it is very important to be well versed with the procedures of chemistry.

One lecture - roon should be prepared as a chemistry laboratory.

Therefore one set of demonstration material "Chemistry" is proposed.

See: a). Fa. Leybold

2.3.3. Staff Improvement

No necessity

But if there is no possibility of employing a Maltese national to introduce the new teaching subjects, these can be taught by

Mr. Hohoff,

if required.

2.4. UNIDO Inputs:

ACTION PLAN

2.4.1. Training in Methodology

First it is necessary to train the teachers in methodology and teaching - techniques.
It is proposed that:

> One UNIDO - expert be sent to Malta for about 4 weeks to train the teachers in this subject. (refreshing)

2.4.2. Equipment

As a next step the institute could be provided with the recommended equipment, especially for the new subjects.

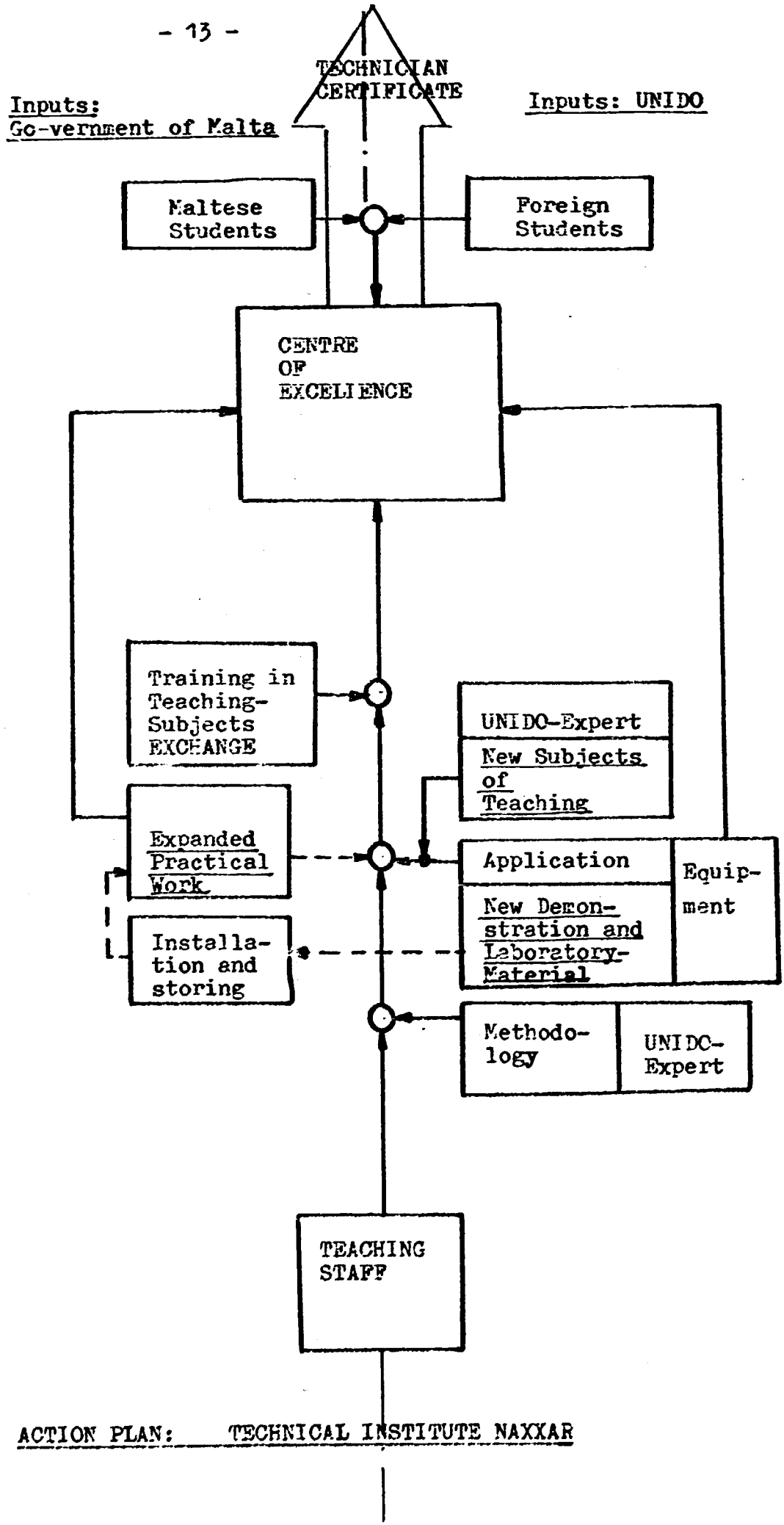
2.4.3. Introduction of the proposed teaching subjects

After the Institute has been equipped with the new demonstration and laboratory equipment it seems to necessary to send an UNIDO - expert for about 8 weeks to TIN, who is able to introduce the new subjects and to familiar the teachers of TIN with the application and use the new equipment.

2.4.4. Training of teachers in their teaching subjects

When the teachers have completed their training in methodology and the introduction to the new subjects, they should be ready to participate in an exchange with other countries for the pupose of widening their knowledge.

See: Action Plan page 13



ACTION PLAN: TECHNICAL INSTITUTE NAXXAR

3. Estimated Cost

For both Institutes the facilities and staff could be provided by the Maltese Government, whereas other sources will have to be found to finance the equipment.
The Maltese Government did not state their opinion on this matter.

3.1. Equipment: Pellenberg Institute

The statement of costs depends on several facts and is calculated by Fa. Leybold - Heraeus, Köln:

1. Control and Automatic Control Engineering	
a). Demonstration materials	DM 150 000
b). 12 sets training materials for students	DM 600 000
2. Engineering Science	
Demonstration materials	DM 120 000
3. AF and HF (RF) Lines and Fundamentals of Electronics	
Demonstraion materials	DM 100 000
(12 sets training materials for the students, if required)	(DM 600 000)
Sum:	DM 970 000
≙ $ 328 000 ≙	£M 157 000

3.2. Equipment: Naxxar Technical Institute

1. Control and Automatic Control Engineering	
a). Demonstration materials	DM 150 000
b). 12 sets training materials	DM 600 000
2. Chemistry	
Demonstration materials	DM 100 000
3. Pneumatics	
a). Demonstration materials	DM 10 000
b). Training materials for students 12 sets	DM 60 000

4. Fundamentals of Electronics

a). Demonstration materials	DM 100 000
b). 12 sets training materials for students	DM 600 000
Sum:	DM 1 620 000

≙ $ 463 000 ≙ £M 253 000