1994

Education and training of seafarers in Mozambique

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WORLD MARITIME UNIVERSITY

Malmo _ Sweden

EDUCATION AND TRAINING OF SEAFARERS IN MOZAMBIQUE

By

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MOZAMBIQUE

A dissertation submitted to the World Maritime University in partial fulfillment of the requirements for the award of the degree of a

MASTER OF SCIENCE

IN

MARITIME EDUCATION AND TRAINING.

(Engineering)

Year of graduation

1994

DECLARATION.

I certify that all the material in this dissertation which is not my work has been identified. The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ACKNOWLEDGEMENTS

My sincerest thanks and gratitude are adressed to those, who have provided me with opportunity to undertake the two-year Master's Course at the World Maritime University. Likewise, I would like to thank the MET staff, especially the course professors of both MET(N) and MET(E) as well as the lecturers.

Special thanks are also extended to my wife, Ondina and my sun, Bruno for their patience and understanding.

AIMS

An aim of this study is to make a comparison between the actual Mozambique Maritime Education and Training system and the MET standards of the international maritime community, and further, to develop proposals to upgrade the system to meet the challenge of new standards.

OBJECTIVES

Any Maritime Nation today should be cognizant of the crew of today and tomorrow, which have to be more skilled and more highly trained than ever before. Marine officer's training is of growing importance since modern ships with their high technology call for good knowledge of operation and maintenance. Lack of competence of the Marine Officer on board ships might result in a serious disaster.

The principle objectives of this study are:

1. To examine the actual MET situation in Mozambique and identify the strengths and shortcomings in the system at present.
2. To identify the present international standards of training and to draw a comparison with those of my own country.

3. To evaluate and compare the Mozambique MET with the Standards of Training, Certification and Watchkeeping for Seafarers, and develop proposals for an upgraded engineering program.

4. To draw conclusion from the study and make appropriate recommendations.

OUTLINE PLAN

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LIST OF ABBREVIATIONS AND PHRASES.

MARAD..... Maritime Administration.

IMO.....International Maritime Organization.

WMU..... World Maritime University.

STCW..... International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

FRELIMO..... Frente de Libertacao de Mocambique. (Front for Liberation of Mozambique).

RENAMO..... Resistencia Nacional de Mocambique. (Mozambique National Resistance).

NSM ..... Nautical School of Mozambique.

NAVIQUE..... Empresa Mocambicana de Navegacao. (Mozambican Shipping Company).

NAVINTER.... Empresa de Navegacao Internacional. (Interprise of International Shipping).

MOCARGO.....Empresa Mocambicana de Cargas. (Mozambican Interprise of cargo handling).

AMI.....Agencia Internacional Maritima. (International Maritime Agency).

ANFRENA..... Agencia Nacional de Frete e Navegacao. (National Agency of freight and shipping).

BEIRA CORRIDOR...Is the center port-railway system, which provides a link to the South Africa, Suaziland, Zimbabwe, Malawi and Zambia.

USSR ..... The Former Union of Soviet Socialist Republics.

MCE ..... Malaysian Certificate of Education.

HSC ..... High School.

SSC ..... Secondary School.

MT ..... Marine Transportation.

MET ..... Maritime Education and Training.

CHAPTER 1

INTRODUCTION TO MOZAMBIQUE AND ITS MARITIME INFRASTRUCTURES.

1.1 LOCATION OF MOZAMBIQUE.

Mozambique, a former Portuguese colony, is located in Southeastern Coast of Africa, opposite the Island of Madagascar, and has an area of 789,800 sq km.
(see fig.1.1).

Mozambique is bordered by Tanzania to the North, the Indian Ocean to the East, by the Republic of South Africa to the South, Zimbabwe to the West and Zambia and Malawi to the North_West. Mozambique has a coast line of 2,470 km. The country is divided into provinces, and has a population of about 15 million. Maputo is well known as a capital city.

Agriculture, fishing and mining are the pricipal components of the Mozambique economy. Over the last decade, internal war between FRELIMO and RENAMO as well as natural disasters have hampered growth and spurred inflation. As a result, the cost of living has doubled between 1988 and 1992.

A cease_fire agreement was declared and a peace agreement was signed in 1993 between FRELIMO and RENAMO. Recovery is now taking place .

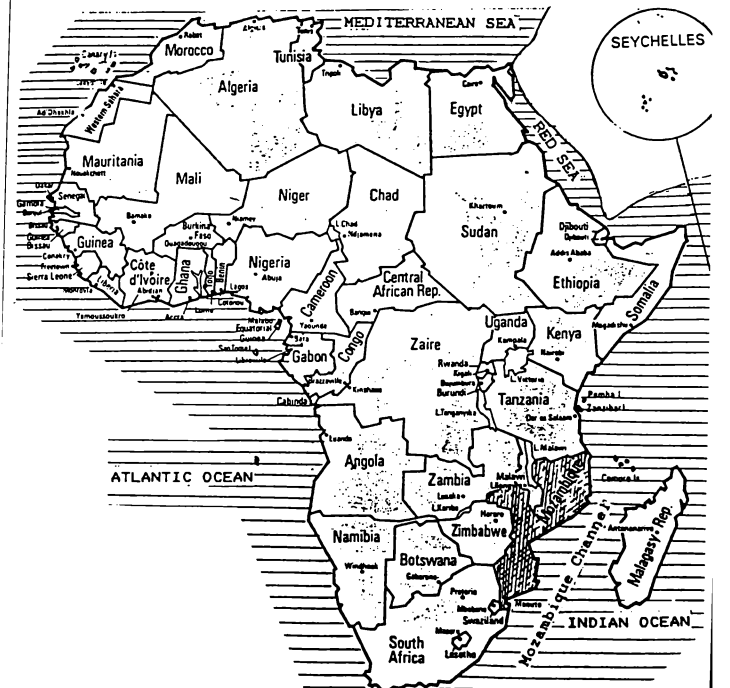

FIG. 1.1 LOCATION OF MOZAMBIQUE.

Source: Borrowed

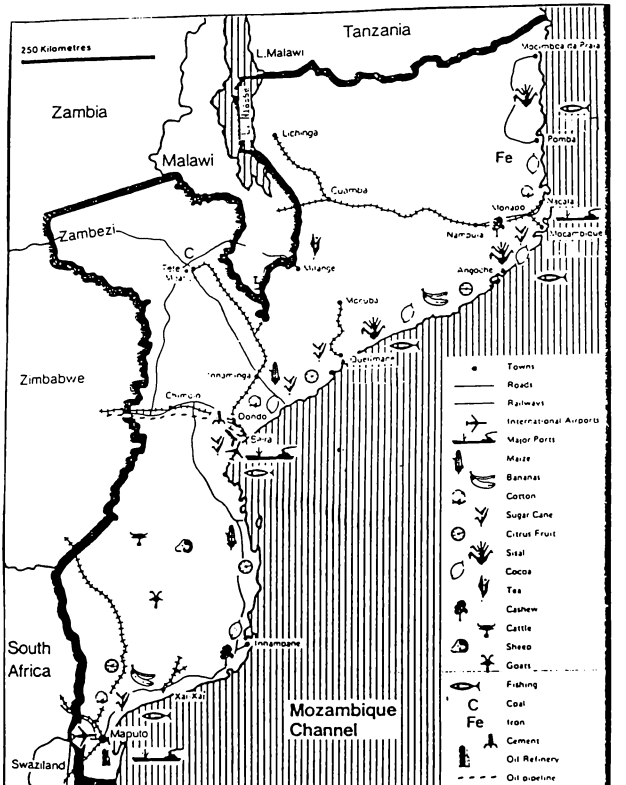

FIG. 1.2 MOZAMBIQUE AND ITS RESOURCES.

Source: Borrowed

1.2 PORTS

Under normal conditions the country derives much of its income from charges on goods carried between Zimbabwe, Zambia, Malawi, Swaziland and South Africa. This gices rise to the importance of the "BEIRA CORRIDOR" in Beira port, which is a link between Zimbabwe and Beira harbour. The BEIRA harbour geographically, is located at approximately the midpoint of the Mozambique coast line.

The main ports from south to north are Maputo port(the second largest port in Africa), Beira port, Quelimane port and Nacala port. Maputo port has an excellent multi_purpose harbour with a high handling capacity in range of 7 to 12 millions metric tons per year. Shipments from and to the neighbouring countries are mostly done through Beira port.

The ports of Inhambane, Pemba, Macuse and Chinde are small and they are mostly used for movement of national commodities from places where they are produced to places of consumption.

1.3 MARITIME ADMINISTRATION

In carrying out activities within the maritime field, a government needs to have an efficient administrative machinery to effect the adoption and implementation of the national and international law, regulations, and other related matters. In Mozambique, this machinery is provided through a Maritime Administration which is carried out under the Ministry of Transport and Communications.

The MARAD structure comprises several departments encompassing all matters within the field of maritime activities. The actual structure is to be changed, because a new Maritime Safety Department is to be established.

The National Directorate of merchant marine is the principal organization responsible for all matters related to maritime activities. The National Directorate of merchant marine falls organizationally under the Ministry of Transport and Communications.

As earlier mentioned, a new Maritime Safety Department is to be established with the functions of:

1. Exercise of sovereignty and jurisdiction in the internal waters.

2. Registration of ships.
3. Surveys,inspections and certification of national ships.
4. Port State Control of foreign and national ships.
5. Registration of seamen.
6. Examination and certification of seafarers.
7. Promotion of marine environmental prevention and combate of maritime pollution.
8. Deal with crew matters in general.
9. Deal with matters pertaining to Maritime Search and rescue.
10. Control of ships manning.
11. Control of Maritime Traffic and related matters.
12. Deal with wrecks and salvage in national jurisdiction.
13. Advise government on all marine technical matters.

1.4 SHIPPING COMPANIES

As far as shipping business is concerned, Mozambique possesses mainly national shipping companies. Among them NAVIQUE is the largest in the country owning nine vessels including container ships, general cargo ships and tank ships. (see TABLE 1.1).

NAVIQUE performs liner services for the carriage of cargo and passengers within the national and regional waters. Navique's vessels are fully manned by national merchant marine officers trained mainly by the Nautical School of Mozambique with exception of a few officers, which were trained by former USSR and Brazil. The shipping company runs its own vessels, however, vessels are also occasionally chartered.

NAVINTER is a state shipping company dealing in international shipping. The NAVINTER shipping company does not have its own vessels so it operates as shipping agency in tramp shipping services.

ANFRENA represents a number of foreign shipping companies, the ships of which call at Mozambique ports. There are other agency companies such as: MOCARGO, which is a state enterprise. MANICA FREIGHT SERVICES and AMI Mozambique are private.

CHAPTER 2

MET IN MOZAMBIQUE

The term "education at high level" might be applied to the process whereby a society or state seeks to furnish itself with wise rulers, brave warriors, efficient businessmen and industrious workers. Some social mobility has always been possible within a society, and education has been a key means of supplying it.(Richard 1982)

National education in Mozambique was generally affected by factors of colonization and war. After Mozambique became independent in 1975 there was a government proposal from the Ministry of Transport and Communications, to set up and develop a new Mozambique merchant marine, which meant establishing a means of Maritime Education and Training for Seafarers in Mozambique.

Until 1975, all shipping activities within the country were carried out by foreign_ government enterprises utilizing ships manned by foreign officers.

2.1 MOZAMBIQUE NAUTICAL SCHOOL

Despite difficulties, infrastructures were linked and a Nautical School was set up. The main role of the School was to prepare national marine officers with sufficient maritime background just to meet the national needs.

Initially, the Nautical School was furnished with only essential facilities, so that minimally the core courses (Navigation, Engineering and Radio) could be run. A narrowly focused curriculum was developed to satisfy only the basic requirements of the national maritime legislation in the field of maritime activities.

In 1977 the first class, composed of one hundred cadets following navigation, engineering and radio courses, was enrolled at Nautical School. The candidates had only to fulfil the minimum academic requirements. The practical training of cadets was performed on board ships trading in coastal and regional waters.

Although these laudible efforts were made by the government, few successes were achieved, and new proposals were developed.

In 1980, Mozambique became a Party to the STCW 78 Convention which commited the Mozambique Nautical School to increase the training standards to at least Convention levels.

Bilateral agreements were signed between the Mozambique government and the IMO so that the School could get technical assistance from the IMO Integrated Technical Co_operation Programme.

In 1983, the Norwegian Project SHIPDECO was allocated and set up at the Nautical School of Mozambique. New facilities were provided and a new curriculum was also designed so that the Nautical School programme could meet the minimum requirements of STCW convention.

The cadets were integrated into the new Nautical School programme, and up to the present day, the activities carried out at the Nautical School have been and are considered satisfactory.

Presently, the education and training of seafarers is performed at the unique existing Nautical School which is located in the capital city, near the Maputo port entrance. A beautiful view of the sea and of vessels entering the port can be enjoyed from the School.

The School has a capacity of approximately one hundred cadets and it is headed by the general Director, who is required to ensure that regulations are faithfully observed and that all matters are carried out within the School according to the expectations of the National Maritime Directorate. The director manages the organization and keeps its interrelated parts functioning.

The school is provided with a cadet residence, a restaurant, a swimming pool, class rooms, a conference room, a library, a computer laboratory, a bridge simulator, workshops, electric and electronic laboratories, a navigation aids laboratory, as well as visual and audio aids.

For those staff and cadets, who enjoy physical exercises, not far from the School there is a gymnasium, fully equipped with a variety of exercise equipment. In the way of expected future enhancements the school has requested quotations on Global Maritime Distress and Safety System (GMDSS), safety/communications equipment to comply with the new amendments to the SOLAS regulations. A development of a fire_fighting centre is also under consideration.

2.1.1 ADMINISTRATIVE AND MANAGEMENT STRUCTURE

By definition, administration refers to the range of activities connected with organizing and supervising the operation od an institution, or other organization functions. This term may also refer to the specific group of people that manages and supervises it. For management, administration implies the control of the activities, within an institution or organization.

The actual Administrative and Management structure of the Nautical School of Mozambique can be laid as shown in the diagram. (See FIG. 2.1).

The governing authority of the School is the Ministry of Transport and Communications, the duties of which are performed through the Board of Governors. This Board of Governors is the school high level decision making body.

The School, as mentioned before is headed by the General Director, who is required to make ensure that regulations within the charter are faithfully observed and that all matters concerning administrative, management and academic issues are carried out within the School, according to the expectations of the organizational chart.

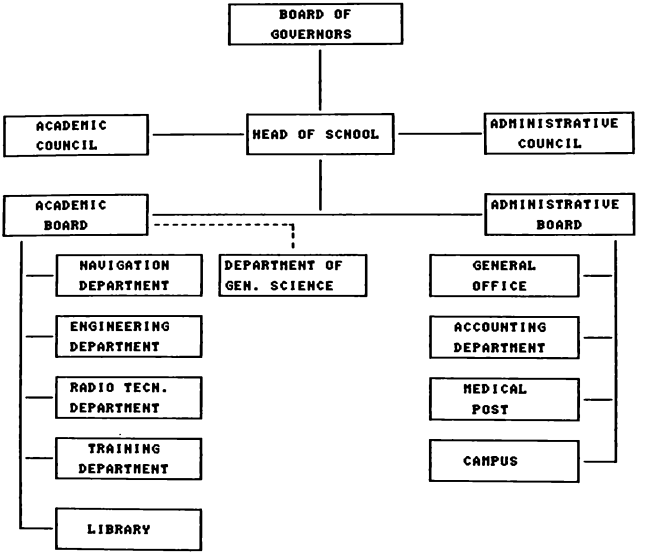

FIG.2.1 NAUTICAL SCHOOL ORGANIZATIONAL CHART

SOURCE: AUTHOR

The Academic and Administrative Council are decision making bodies at a lower level. The Pedagogic Board, which is headed by the Pedagogic Director is responsible for the performance of the Navigation, Engineering and Radio Technical departments or in practical terms, is responsible for all matters concerning the skills, methods and theory of teaching. The Pedagogic Director assists the General Director in academic matters. The department of General Science undertakes the functions of planning and delivering course programs for general subjects. The department is headed by the national senior lecturer with a high diploma in Mathematics and Physics.

The Administrative Board takes care of all matters regarding support services, which are necessary for effective running of the all School activities. This include general services, accounting, assets and stocks. The Administrative Board, headed by Administrative Director, comprises general office, accounting, medical post and campus.

All matters concerning reception services and issue of the course certificates are performed by the general office, which is headed by Chief office.

The Accounting Section undertakes the function of allocate the financial resources for normal running of the School activities. The Section deals principallyy with issues concerning the staff wages, financial requests and expenditures. Both Directors, Pedagogic and Administrative, account to the General Director.

NATIONAL TEACHING STAFF

The most crucial situation facing the School is effective recruitment of teaching personnel especially for the most technical course subjects.

Fortunately, within the last few years the effort made by the school administration has resulted in a great success. The actual national teaching staff comprises:

NAVIGATION DEPARTMENT

The Department is supported by six teachers for navigational subjects, two of which are at WMU completing a Master's Degree in Maritime Education and Training (Nautical).

ENGINEERING DEPARTMENT

The Department comprises Seven teachers for engineering subjects, two of which are at WMU completing a Master's Degree in Maritime Education and Training (Engineering).

RADIO TECHNICAL DEPARTMENT

The Radio Technical Department is provided with five teachers for Radio subjects, two of which are in Portugal doing Post-graduation studies. The Department is headed by the national lecturer.

All teachers for technical subjects are graduates of the Nautical School of Mozambique, most of them are holders of First Class Certificates and some are doing post-graduate studies and specializations.

GENERAL SUBJECTS

The Department of General Science comprises seven teachers for general subjects. National teachers for Maritime Economics, Maritime Law, Maritime Administration, Meteorology, 1st Aid and Maritime English are under part time contract.

EXPATRIATE TEACHING STAFF.

The Navigation and Engineering Departments are headed by the expatriate Master and Chief Engineer lecturers. There also are two expatriate lecturers for technical subjects.

2.1.2 NAVIGATION DEPARTMENT

Navigation department is responsible for all training. Such responsibility includes organization and improvement of teaching conditions such as, teaching material, teaching staff, review and update of nautical programmes and evaluation of the courses.

The Navigation course at Nautical School offers to the Deck cadets a necessary maritime background to become a Master mariner of any merchant ship, according to Standards of Training, Certification and Watchkeeping for Seafarers, STCW 78 requirements.

The programmes (see TABLE 2.1) are designed based on IMO Model Courses 7.01 and 7.03, which give more detailed course guidance. The candidates who want to enter the Nautical School, for Navigation Training, must fulfil the following requirements:

1. Secondary school completed (12 classes).
2. Pass entry specific examinations (Mathematics, Physics and Portuguese Language).
3. Medical fitness examination.
4. Minimum age (18 years).

TABLE 2.1

NAUTICAL SCHOOL OF MOZAMBIQUE

NAVIGATION DEPARTMENT

COURSE PLAN

COD	SUBJECTS		HOURS
1N01	PHYS.FITN.	I	72
1N02	MATH.	I	165
1N03	PORT.LANGUAGE		90
1N04	ENGLISH	I	144
1N05	PHYSICS		108
1N06	COLREG	I	90
1N07	AIDS TO NAVIG		54
1N08	NAVIGATION	I	216
1N09	NAV.ARCHIT.	I	90
1N10	SHIP KNOWL.	I	90
1N11	ELECTROTEC.		108
1N12	MED.CARE	I	36
1N13	SAF.PERSON.		36
1N14	BAS.F.FIGH.TRA.		18
1N15	AD.F.FIGH.TRA.		54
TOTAL 1N.....			1368

2N01	PHYS.FITN.	II	72
2N02	MATH.	II	72
2N03	MAR.ENGL.	I	90
2N04	METEOROL.	I	90
2N05	MAR.SAFETY	I	72
2N06	CARGO&STOWAGE	I	90
2N07	NAV.AIDS	I	90
2N08	STABILITY	I	90
2N09	SHIP KNOWL.	II	90
2N10	NAVIGATION	II	234
2N11	RADIO COMM.		90
2N12	MARINE ENGIN.		72
2N13	NAV.AIDS	II	90
2N14	COLREG	II	54
TOTAL 2N.....			1386

3N01	PHYS. FIT.	I	72
3N02	COMPUTER LEARN.		72
3N03	MAR.ECONOM.	I	72
3N04	PRINC.MANAGEM	I	72
3N05	MAR. LAW	I	90
3N06	METEOR.OCEANOG		54
3N07	CARGO&STOW.	II	216
3N08	CONST.MAI.SHIP		72
3N09	STABILITY	II	108
3N10	NAVIGATION	III	234
3N11	MAR.ENGLISH	II	198
3N12	SHIPBOARD MAN.		36

TOTAL 3N.....1296

4N01	PHYS.FITN.	IV	36
4N02	PRINC.MAN.	II	54
4N03	PROJECT WORK		108
4N04	MAR.LAW	II	54
4N05	MAR.ECONOM.	II	54
4N06	MED.CARE	II	54
4N07	NAVIGATION	IV	72
4N08	COLREG	III	54
4N09	MAR.SAFETY	II	72
4N10	MAR.ENGL.	III	90

TOTAL 4N.....648

NOTE: 1N...2 SEMEST.

2N...2 SEMEST.

3N...2 SEMEST.

4N...1 SEMEST.

Source: Navigation course plan (NSM).

Before the cadets join their specific courses, they undergo a module called PRE_SEA TRAINING, which comprises two months of intensive studies concerning ship knowledge, member crew functions, as well as safety of personnel on board ships. With such theoretical background, the cadets undergo sea training on board merchant vessels for a duration of four months, which provides them with shipboard experience.

To become Deck Officers, in addition to theoretical knowledge, the Cadets are required to obtain the necessary sea training on board national ships, which should be done during their course of study.

The Navigation course comprises three stages (Table 2.4): The first stage two years is mostly devoted to general and technical subjects. This program is in accordance with the appendix to regulations II/4 and II/3 of the STCW 78 Convention, which enable the cadets with sea training and sea service stated in the Convention, to become a watchkeeping, second and chief officers as stated in the regulations II/4 and II/3 of the STCW 78 Convention. Second stage - sea traning.

TABLE 2-4

NAUTICAL SCHOLL TRAINING SCHEME

	PRE-SEA	1ST STAGE	2ND STAGE	3RD STAGE
COURSE	6 MOHTHS	2 YEARS	1 YEAR	1 YEAR
NAVIGATIOH	SEA TRAINIHG	SCHOOL	SEA TRAIHING	SCHOOL
ENGINEERING	SEA TRAINING	SCHOOL	SEA TRAIHING	SCHOOL
RADIO	SEA TRAINIHG	SCHOOL	SCHOOL	PRACTICE

SOURCE: HSM

Lastly, at the third stage, the Cadets will take the subjects which are prescribed within the appendix to regulation II/2 of STCW 78 Convention for the mates and masters certification.

ACQUIRED KNOWLEDGE

Required knowledge for the Deck Officers is found in the appendixes to regulations II/1, II/2, II/3, II/4, II/5, II/7 and II/8 of STCW 78. Which knowledge to which officer, depends on whether the certificates are to be issued to Master, Chief mates or to Watchkeeping officers to ships of 1600 grt or more, or to ships of between 200 and 1600 grt.

2.1.3 ENGINEERING DEPARTMENT

The Engineering Department is where engineering training is performed, and is responsible for all issues related to efficient running of Engineering Training.

An Engineering Course at Nautical School of Mozambique, offer to the Engineer Cadets the necessary maritime background to become a Marine Chief Engineer Officer of any merchant ship, according to Standards of Training, Certification and Watchkeeping for Seafarers, STCW 78 requirements.

The programmes (see TABLE 2.2) are designed based on IMO Model Courses 7.02 and 7.04, which give more detailed course guidance.

TABLE 2.2

NAUTICAL SCHOOL OF MOZAMBIQUE

ENGINEERING DEPARTMENT

COURSE PLAN

COD	SUBJECTS		HOURS
1M01	PHYS. FIT.	I	72
1M02	MATH.	I	144
1M03	PHYSICS	I	72
1M04	TEC. DRAWING		144
1M05	GEN. ENGLISH		72
1M06	ELECTRICITY		108
1M07	SHIP MAINT.	I	144
1M08	WORKSHOP		144
1M09	TOOLS & MACHIN.		180
1M10	WELDING		144
1M11	FIRST AID		36
1M12	SAF. PERSONNEL		36
1M13	BASIC F.FIGHT.		18
1M14	AD. F.FIGHTING.		54
TOTAL.....			1440

2M01	PHYS. FIT.	II	72
2M02	MATH.	II	72
2M03	PHYSICS	II	72
2M04	POR. LANG		72
2M05	MAR. ENGL.	I	72
2M06	ELECTRONICS	I	108
2M07	MAR. ELECTROT	I	144
2M08	AUTOMATION		72
2M09	THERMODYNAM.	I	144
2M10	SHIP MAINT.	II	180
2M11	AUX. MACHIN	I	210
2M12	WORKSHOP PRACT.		108
2M13	INDUST. CHEMIST.		72
TOTAL 2M.....			1404

3M01	NAV. ARCH	144
3M02	SHIP MACH. PROP	180
3M03	THERMODYNAM. II	54
3M04	MAR. ENGL. II	144
3M05	OIL & LUBRIF.	54
3M06	ENG. ELECT. III	144
3M07	AUT. CONTROL	108
3M08	REFRIGERATION	144
3M09	B;ILERS & TURB.	90
3M10	PHYSICS III	108
3M11	STRENGHT MATER.	108
3M12	BAS. NAVIGATION	54

TOTAL 3M.....1332

4M01	COMP. LEARNING	72
4M02	MAR. ENGL. III	144
4M03	MAR. LAW	108
4M04	MAR. ECONOMICS	54
4M05	SHIPBOARD MAN.	90
4M06	PROJECT	162
4M07	CONT.PREV.POLL.	36

TOTAL 4M.....666

Source: Engineering course plan (NSM).

The candidates who enter the Nautical School for Engineering Training, should fulfil the same obligations as required for Nautical Training.

To become Engineering Officers, apart from theoretical knowledge, the Engineering Cadets are required to obtain the necessary sea training onboard national ships, plus a period of workshop practice located at the school.

The Course duration and steps for the Engineering Training are the same as for the Navigation Training differing only on their programmes and total time of study.

ACQUIRED KNOWLEDGE

Required knowledge for the Engineer Officers includes the subjects prescribed in the appendixes to Regulations III/1, III/2, III/3, III/4, III/5 and III/6 of STCW 78 Convention. Certificates may be issued at various levels dependent upon the competencies attained. Certificates may be issued to Chief Engineer Officer, Second Engineer Officer or to Watchkeeping Officer to ships powered by Main Propulsion Machinery of 3000 kw propulsion power or more or to ships powered by Main Propulsion Machinery between 750 kw and 3000 kw propulsion power.

2.1.4 RADIO TECHNICAL DEPARTMENT.

The Radio Technical Department is responsible for all issues related to efficient operation of the Radio Technical Training Program. The Radio Technical Course at the Nautical School, offers to the Radio cadets the necessary background within the field of Maritime Communications and Aids to Navigation. The Course aim is to train the Radio cadets in the field of analog and digital electronics.

Within the studies, practical classes are devoted to the laboratory practice with a variety of electronic equipment mainly found on board ships, so that, by the end of the Course, the Officers will be able to overcome many issues related to operation, repair and maintenance of electronic equipment on board ships, as well as ashore.

Within this area of specialization, equipment for Maritime Communications and Aids to Navigation are also included. At the end of the Course the cadets are expected to undergo one year of additional practice with a shipping company or in an organization, where an electronic laboratory is available.

The candidates who desire to attend the Radio Technical Course should in general fulfil the requirements prescribed for other Courses. Those with a practical electronic background may also be enrolled.

The programmes (see TABLE 2.3) are designed based on Radio Regulations IV/1, IV/2, and appendix to Regulation IV/3 of the STCW 78 Convention, which set the Mandatory Minimum Requirements for Certification of Radio Officers, Radiotelephone Operators.

TABLE 2.3

NAUTICAL SCHOOL OF MOZAMBIQUE

RADIO DEPARTMENT

COURSE PLAN

COD	SUBJECTS	HOURS
1C01	PHYS. FIT. I	108
1C02	MATH. I	90
1C03	POR. LANG.	54
1C04	FIRST AID	36
1C05	MATH. II	90
1R01	TEC. ENGL. I	180
1R02	GEN. PHYSICS	54
1R03	SAF. AT WORK	36
1R04	GEN. CHEMISTRY	54
1R05	TEC. MESUREM.	90
1R06	ELECTROTEC.	180
1R07	ANALOG ELECTR.I	168
1R08	DIGITAL ELECT.I	180
TOTAL	.....	1320
2C06	COMP.LEARNING	90
2C07	PHYS. FIT. II	108
2R09	AIDS NAVIG. I	216
2R10	RADIO COMM.	162
2R11	DIGITAL ELEC.II	180
2R12	APPL. ELECTR.	216
2R20	TEC. ENGL. II	144
2R21	MATH. III	72
2R22	MATH. IV	72
2R23	TEC. DRAWING	54
TOTAL	.....	1314
3C08	PHYS. FIT. III	90
3R13	RADAR	180
3R14	AIDS NAVIG. II	252
3R15	MICROPROCES. I	180
3R16	RADIOTELEPHONE	72
3R17	RAD. COM. EQUIP	180
3R18	MICROPROCES. II	144
3R19	ADMINISTRATION	54
3R24	TEC. ENGL. III	144
TOTAL	.....	1296

Source: Radio course plan (NSM).

2.1.5 TRAINING OF CADETS.

The training of Cadets is performed basically on board national vessels , but a few cases of Cadets trained on board ships under charter party terms are also found.

As stated before, the newly enrolled cadets are required to undergo pre-sea training, which comprises six months. (TABLE 2.4). The first two years for both courses Navigation and Engineering is followed by one year sea training, which will allow the Cadets to continue their studies in the final stage. Alternatelly, they may be graduated with a Watchkeeping Certificate at this stage should they not wish to continue their studies.

Regarding sea time for certification, it may vary according to national maritime legislation.

2.1.6 QUALIFICATIONS.

A successful completion of the complete program for all Courses Navigation, Engineering and Radio, with a minimum length of sea time or practice specified within the programmes for each Course, will qualify the cadets as Bachelors of Science Degree in the applicable course.

Additional studies are available. The Radio Officers might be again enrolled in School after one year practice, for an Advanced Maritime Communication Course, which will lead to the award of a diploma degree.

2.1.7 CERTIFICATES OF COMPETENCY.

One of the objectives of the STCW 78 Convention is that the Seafarers must be properly trained and consequently, be certified. The issuance of certificates of competency within the country is performed at the Ministry of Transport and Communications.

The Officers of all courses, apart from the STCW requirements concerning Examination and Certification of Seafarers, are required to fulfil the National Maritime Regulations.

CHAPTER 3

STCW 78 AND INTERNATIONAL STANDARDS

3.1 STCW 78

Recognizing the importance of establishing mandatory standards of competence and other mandatory provisions necessary to ensure that all seafarers will be properly trained, adequately experienced, skilled and competent to perform their duties in a manner which provides for the safety of life and property at sea and the protection of marine environment, the International Conference on Training and Certification of Seafarers adopted the STCW Convention.

Standards of Training, Certification and Watchkeeping for Seafarers, STCW 78 is a maritime safety convention adopted 7 July 1978 and entered into force 28 April 1984. The aims and objectives of the convention are to set world-wide Global Minimum Standards of Competence of Seafarers, Global Harmonization of Standards of Training and Examination of Seafarers, Global Acceptance of Certificates granted under the Convention and the Global Safe and Efficient Manning of ships, which in practice allowed individual countries to go their own diverse ways with training, and still have a globally accepted product.

The technical provisions of the convention are contained in an Annex, which is divided into six Chapters.

3.1.1 CHAPTER I. GENERAL PROVISIONS.

The first Chapter (Regulations I/1-4) contains general provisions regarding respectively definitions, content of certificates and form of endorsement, principles governing Near_coastal Voyages and control procedures.

3.1.2 CHAPTER II. MASTER_DECK DEPARTMENT.

The second Chapter deals with Master-Deck Department outlining the basic principles to be observed in keeping a navigational watch (Reg.II/1), Mandatory Minimum Requirements for the certification of Masters, Chief Mates and Officers in charge of navigational watches on ships of 200 grt. or more (Reg.II/2).

Regulation II/3 sets the Mandatory Minimum Requirements for Officers in charge of navigational watches and Masters of ships of less than 200 grt. The Regulation establishes the requisites for ships not engaged on near-coastal voyages and ships engaged on near-coastal voyages.

Regulation II/4 establishes the Mandatory Minimum Requirements for Certification of Officers in charge of a navigational watch in ships of 200 grt or more.

Regulation II/5 is designed to ensure the continued proficiency and updating of knowledge for Masters and Deck Officers.

Regulation II/6 describes the Mandatory Minimum Requirements for ratings forming part of a navigational watch.

Regulation II/7 establishes the Basic Principles to be observed in keeping a watch in port.

Finally, the Regulation II/8 establishes the Mandatory Minimum Requirements for a watch in port on ships carrying hazardous cargo.

3.1.3 CHAPTER III. ENGINE DEPARTMENT.

The third Chapter deals with the Engine Department outlining also the basic principles to be observed in keeping an engineering watch (Reg.III/1).

While requirements for deck officers vary according to the tonnage of the ship, for engineer officers the determining factor is the power of main engine.

Mandatory Minimum Requirements for certification of Chief and Second Engineer Officers of ships with Main Propulsion Machinery of 3000 kw or more (Reg.III/2) and for ships of between 750 kw and 3000 kw (Reg.III/3) are set forth in this Chapter.

Mandatory Minimum Requirements for the certification of Engineer Officers in charge of watch in a traditionally manned engine room, or the designated engineer in a periodically unmanned engine room are contained in Regulation III/4.

The requirements to be met for the continued proficiency and updating of knowledge of the Engineer Officers are in Regulation III/5.

Chapter III also gives Mandatory Minimum Requirements for Ratings forming a part of an engineering watch (Reg.III/6).

3.1.4 CHAPTER IV. RADIO DEPARTMENT.

The forth Chapter deals with the Radio Department, Radio Watchkeeping and Maintenance. This chapter goes on to establish mandatory minimum requirements for certification of radio officers and radio operators (Reg.IV/1), and requirements to ensure their continued proficiency and updating of knowledge (Reg.IV/2).

Regulation IV/3 establishes the mandatory minimum requirements for certification of radiotelephone operators.

3.1.5 CHAPTER V.
SPECIAL REQUIREMENTS FOR TANKERS.

The fifth Chapter (Regulations V/1-3) states the special requirements for Tankers. The chapter deals meanly with additional Mandatory Minimum Requirements for the training and qualification of Masters , Officers and Ratings for oil, chemical and liquefied gas tankers.

3.1.6 CHAPTER VI.

PROFICIENCY IN SURVIVAL CRAFT.

Chapter VI (Regulation VI/1) is related to Proficiency in Survival Craft. Mandatory minimum requirements for the issue of certificates of proficiency in survival craft are stated in the Regulations.

Most of the convention regulations are supplemented by its appendixes, which give more detailed syllabix of the subjects concerned.

The Regulations of the Convention are augmented by 23 Resolutions adopted by the Conference, many of which contain more detailed provisions on the subjects covered by the Convention itself. These resolutions contain guidance and advice to shipowners and mariners, especially for officers in charge of a watch, training requirements and technical matters.

This 1978 Convention was the first attempt to introduce global standards for seafarers, but it is now out of date. A series of amendments to the Convention have been made, which will take into account many of technical developments that have occurred over the last twenty years.

3.2 INTERNATIONAL STANDARDS.

Standards in MET define the level of quality or achievement, which is acceptable world_wide. The most common international standards have been developed through the United Nations and its specialised agencies. These related with training apart from IMO, are:

1. International Labour Organization (ILO).
2. United Nations Development Program (UNDP).
3. World Maritime University (WMU).

The main duty of all Parties to the Standards of Maritime Education and Training of Seafarers is to contribute effectively so that more efficient and practicable Standards can be achieved and fulfilled.

3.2.1 INTERNATIONAL MARITIME ORGANIZATION.

The convention establishing the International Maritime Organization was adopted in 1948 and entered into force in 1958. The original name was Inter_governmental Maritime Consultative Organization (IMCO), it adopted its new name in 1982 - as permanent International Maritime Body and Specialized Agency of the United Nations dealing with technical matters affecting world shipping and

marine affairs. The International Maritime Organization's role is primarily to develop and adopt treaties and other regulations which are designed to improve the safety of international shipping and to prevent pollution of the world's oceans.

Global Standards for Maritime Training developed by the Organization are incorporated in the STCW 78 Convention and in various recommendations and resolutions. Apart from the assistance provided to the developing countries on establishing and developing their maritime training institutions, IMO has also produced a series of model courses, which reflect a globally acceptable level of training in the various subject areas.

The Flag State and the Port State are the executive bodies, which are tasked with ensuring that the standards are properly implemented and enforced world_wide.

3.2.2 INTERNATIONAL LABOUR ORGANIZATION.

ILO, is an Inter_governmental Organization. The ILO was established in 1919 to bring Governments, Employers and Trade Unions together in the cause of social justice and better living conditions world_wide.

The ILO formulates international policies and programmes with the purpose of helping nations and unions in the process of improving working and living conditions. Matters related to the working and living conditions on board ships are covered by the International Labour Organization Maritime Conventions and recommendations.

3.2.3 UNITED NATIONS DEVELOPMENT PROGRAM.

The UNDP is the largest channel for multilateral technical and pre_investment cooperation in the world. The UNDP objectives are to coordinate and develop programmes for every economic and social sector such as farming, fishing, mining, transport, communications, health, environment protection and training and social welfare.

UNDP projects are aimed to help developing countries to make better use of their human and natural resources, improve living standards, expand productivity and contribute to a sustainable expansion of the world economy.

3.2.4 WORLD MARITIME UNIVERSITY.

One of the most important initiatives taken by the International Maritime Organization was the establishment in 1983 of the World Maritime University.

The charter of the WMU in its objectives and functions says: The WMU is the international maritime institution for the training of senior specialist maritime personnel in various aspects of shipping and related fields concerning the improvement of maritime safety, the protection of the marine environment and the efficiency of international shipping, in furtherance of the purposes and objectives of the International Maritime Organization as specialized agency of the United Nations.

The fundamental objective of the University is to provide the international community, and in particular the developing countries, with a centre for high level maritime training and an effective means for the transfer of maritime technology from the developed to the developing maritime nations, with a view to promoting the achievement, globally, of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and the prevention and control of marine pollution from ships.

3.3 SELECTED MET SYSTEMS.

The most common systems for maritime education and training can be identified as Front-ended and Post-experience. Front-ended system provides a comprehensive undergraduate maritime course with specific knowledge requirements at the entrance stage. The certificates of competency are issued only after the relevant experience at sea has been achieved and the relevant certificate examinations have been performed by the candidates.

Post-experience system requires the candidates to perform sea training before they undertake the respective maritime courses. After the sea training requirements were fulfilled the candidates will undergo a preparatory maritime course for the certificates of competency examinations.

A representative sample composed of leading MET systems, especially those of Post-experience type, commonly used in the Asian countries was selected for use as a standard for comparison in this study.

The selected MET systems are those of Malaysia, The Philippines and Indonesia. Each of these MET systems might be suitable for evaluation purposes relative to the Mozambique MET system.

3.3.1 MALAYSIA.

MALAYSIA is one of the successful Asian Maritime Nations in the context of maritime education and training. The example of success within the maritime education is the Maritime Academy of Malaysia, with primary role of developing and enhancing the knowledge and skills of maritime personnel engaged in and associated with the merchant navy as well as its related industries. Recently designated as a branch of the World Maritime University, it is fast becoming a leading institution in the region.

The academy provides a comprehensive range of professional maritime and shipping courses. The academy is supported by a core of highly qualified and experienced teaching staff, modern training facilities and comfortable accommodation.

Since Malaysia has satisfied to the STCW Convention, all courses are in line with care being taken to offer quality education having good international standing.

Post _ experience type of maritime training system is applied at the academy of Malaysia. The courses are basically taught in English. The minimum admission requirements and requisites for engineer officers are listed in the comparative table(TABLE 3.1).

3.3.2 THE PHILIPPINES.

The Philippines began to institutionalize its maritime education for a professional sea career at the Philippine Merchant Marine Academy in 1820. The increase in demand for maritime manpower motivated private institutions to complement the government's efforts in providing maritime education and training within the country.

When the Philippines acceded to the STCW Convention, maritime training has been developed to improve the qualification and competency of Philippine Seafarers. The Philippines today finds itself playing a major and significant role in international shipping.

The PMMA awards a Bachelor of science degree in marine transportation and marine engineering upon completion of a four year course of study. This is comprised of three years of theoretical studies and one year of sea training as an engineering cadet. This course is offered only by the Philippine Merchant Marine Academy. The PMMA applies the front-ended type of maritime education system.

3.3.3 INDONESIA.

Indonesia as many other countries, has ratified the STCW Convention, which is implemented within the country. The Directorate of Marine Safety and the Education and Training Centre work together for prescribing the standards to be achieved in Certification of competency.

To improve the quality of Indonesian Seafarers, the government has been taking steps whereby no candidate can appear for an examination for a Certificate of Competency without formal education and training.

The following table (TABLE 3.1) gives a comparison of the minimum admission requirements and requisites for engineer officers of the countries concerned.

TABLE 3.1

COMPARATIVE TABLE OF MET SYSTEMS FOR MARINE ENGINEER OFFICERS

ITEMS	MALAYSIA	INDONESIA	PHILLIPINE	MOZAMBIQUE
ENTRY AGE	17	19	17	18
ENTRY LEVEL	MCE	SSC	HSC	HSC
1ST YEAR	ACADEMY	ACADEMY	COLLEGE	COLLEGE
2ND YEAR	ACADEMY	ACADEMY	COLLEGE	COLLEGE
3RD YEAR	SEA TRAIN. WORKSHOP	SEA TRAINING	SEA TRAINING	SEA TRAINING
4TH YEAR	ACADEMY	ACADEMY	SEA TRAINING	COLLEGE
5TH YEAR				COLLEGE
TOTAL DURATION	4 YEARS	4 YEARS	4 YEARS	4 1/2 YEARS
ACADEMIC QUALIFICAT.	DIPLOMA	3RD ENG. OFFICER	DIPLOMA	Bsc
FIRST POSITION	JUNIOR ENGINEER	3RD ENGINEER	JUNIOR ENGINEER	JUNIOR ENGINEER

SOURCE: COMPILED BY AUTHOR

CHAPTER 4

EVALUATION OF MOZAMBIQUE MET SYSTEM AGAINST INTERNATIONAL STANDARDS.

The compliance and implementation of international standards of education and training of seafarers is of growing importance, since the shipping itself is of an international nature.

Many of problems in shipping arise from mis-management of crew resources . The most typical maritime accidents are usually usually the result of a combination of human mistakes, errors or failures. The common concern is that 60-70 percent of accidents at sea arise from human factors. Action to reduce error at sea should include well qualified and motivated marine officers, better procedures and improved regulations and enforcement.

The logical approach to analyse or evaluate a particular system is to look into other viable systems, which have had success in the same field and make comparative studies. The comparative study in this chapter is based on International Standards of maritime education and training and on these of the selected countries.

Traditionally, the Administrative and Management personnel of the maritime institutions are of seafarer background, which to some extent contributes to effective management and better achievement in the field of maritime education and training.

The Government plays the most important role. The proper development of maritime education can be achieved only through appropriate government policy. Is the Government that is ultimately responsible for ensuring through the Maritime Administration the safe manning of the national ships, the competence of its seafarers, the working conditions, the living and working environment, welfare and discipline of seafarers in national ships.

The Government can only accomplish the above stated objectives by having an adequate and competent Maritime Safety Administration, up_to_date and relevant national legislation based on International Regulations and national requirements.

To evaluate the MET system, the first look must be made in relation to the school itself in terms of administration and management aspects.

4.1 SCHOOL ADMINISTRATION AND MANAGEMENT.

The school must act within the framework of national regulations and rules, regarding maritime education. Such regulations should define the school activities and organizational framework, granting a measure of autonomy and independence appropriate to allow the school community to decide about the detailed shape and development of the school.

In normal conditions, the School should be headed by a Master Marine or Chief Engineer Officer holding an Unrestricted High Certificate of Competency plus a Master Degree in Maritime Education and Training.

Moreover, Administrative and Academic Bodies need to be gradually updated and upgraded in terms of key personnel, to achieve better performance and higher efficiencies on a continuing bases.

The Academic Director, apart from a Sea Going High Certificate should minimally hold a Master Degree in MET as well, and possessing some teaching experience.

The Administrative Director should minimally posses a Degree in Business Administration and Finance. The Chief's Office requires a Bsc degree in financial management and accounting. The Assistant's Office requires a person with demonstrated experience and knowledge in the administrative and management field.

The final objective of the school is to train people with different aspirations and abilities, who can form a team necessary to operate todays and tomorrows ship, reliably, efficiently and economically. This requires somewhat specialized skills and abilities, that have to be given by the school.

A proper knowledgeable and capable administrative and academic bodies should be identified and appointed. The functions of the team, among others will be:

1. To communicate with maritime environment.
2. To design, review and update the curriculum and syllabus.
3. To determine the directions of the school development and indicate the ways of their implementation.

4.1.1 SCHOOL TRAINING FACILITIES

The facilities provided within the school are to large degree satisfactory for the purpose of implementing the standards of maritime education and training. However, the curriculum could be improved by the use of an engine room simulator. The use of such a simulator may be a partial solution to the growing problems faced by the school in providing sea training to the cadets. The use of a marine simulator as a training tool is accepted world-wide by the shipping industry as a partial replacement of sea training.

4.1.2 SCHOOL TEACHING STAFF

The main traditional criterion required for the work of a maritime lecturers is the highest certificate of competency in the Deck or Engine branches. The qualification of teaching staff is a key to the success in Maritime Education and Training. The school administration should encourage the lecturers to take further education and specialization, especially in Naval Architecture, Maritime Law and Maritime Economics so that the use of part time lecturers can be avoided.

The teaching staff should be structured according to their level of education and experience in the subject matter and the functions of each member should be clearly stated in the teaching staff regulations. Maritime Institutions do not only need lecturers who understand a particular subject, but also need senior lecturers who have good understanding of maritime affairs, which later on will facilitate cooperation with Maritime Administrations, Shipping Companies, Port Authorities and other maritime interprises.

Maritime lecturers should be qualified to teach basic and advanced maritime subjects to different groups of cadets being aware of the latest developments in international maritime education and training including teaching methods and technology.

4.1.3 SCHOOL TRAINING SCHEME

Maritime Education Scheme is the formal educational program designed to produce trainable and employable graduates for the country's maritime industry.

The previous school training schemes were undefined. In 1993, a proposal for a new training scheme was made by the school administration, which was to enter into force this year (see Table 2.4).

The existing training scheme is practicable, however it is overly long for a Bsc Degree. In contrast to the actual school training scheme, which comprises four years and half, a new four years training scheme is proposed. Details of this four year scheme are given in chapter 5.

The proposed training scheme is four years comprising three phases. The first phase is two years of theoretical studies at school. The second phase is one year of sea training, and third phase is one year of theoretical studies at school.

The reason for the proposed training scheme is that four years and half is quite a long period to train marine officers at the Bsc level, relative to the international standards duration of four years. Apart from that, there are overly frequent complaints from the candidates and officers themselves regarding the time spent at school, relative to the level of the degree awarded. Furthermore, the sea service time, in most of the cases, is very unstructured. There are so many vague and inconsistent ways of defining sea service time for the award of certificates of competency. The absence of an examination following sea service and prior to certification, further exacerbates the problem of the inconsistencies of the sea service period.

Since maritime education of seafarers is of an international nature, there is ample reason to remove ambiguities from the sea training and from the whole system of maritime education. Many Nations have undertaken this initiative by following the maritime training of international character as outlined in the STCW Convention.

4.1.4 SCHOOL CURRICULUM

Curriculum might be defined as all the planned learning opportunities, offered to the learners by the educational institution and the experiences learners encounter when the curriculum is implemented. (MURRAY PRINT, 1993.)

One of the problems faced by the school is a lack of formal agreement on what curriculum should be covered at which course level. Apart from not being fully implemented, the actual curriculum needs to be revised and updated to meet the latest standards.

Given the complexity of the task, careful design, implementation and review of the curriculum will be essential. Student quality is a crucial input to a good training and careful consideration should be given to the size and relevancy of the programmes.

4.1.5 SCHOOL PERFORMANCE

The developing countries, with little formal maritime infrastructure, have found that many problems such as financial, curriculum design and teaching staffing must be overcome for the successful implementation of STCW standards.

The main requirement for those countries is a possession of an effective national maritime legislation, which will control a system for the examination and certification of seafarers before the issue of certificates of competency.

The benefit of having the STCW Convention is that a set of guide-lines is provided on which to base the development of maritime education and training.

In the Mozambique nautical school, there are some achievements indeed, but also a considerable list of shortcomings. Deficiencies in administration and management concerning resources, recruitment of employees and cadet enrollment as well as course programming are among the most prominent.

The question of how effective the STCW 78 standards are implemented within the country and particularly at maritime education and training, can ultimately be answered by the performance of the Maritime Officers in the merchant marine field .

In most of the cases the Officers have only the opportunity to perform their duties within the cabotage trade, which to some extent, might contribute to poor evaluation for international purposes. Within the Mozambique merchant marine , only a few cases of Maritime Officers engaged in international trade might be found occasionally.

There are many, often opposed views about how standards should be achieved. The National Administration lacks the power and authority to ensure the STCW compliance. Further, the National Legislation concerning Standards of Education and Training of Seafarers is quite vague and is in some cases silent.

A number of internal efficiency measures such as students enrollment, teaching and learning performance as well as school relevancy in relation to the maritime environment should be taken into account.

Systematic review and update of the school programmes is crucial to ensure that national certificates have and will continue to reflect high standards of training and competency. The school administration should ensure that the entrants are trained in personnel survival, fire_fighting and basic first aid within the first phase, before going to sea.

CHAPTER 5

PROPOSED TRAINING PROGRAM FOR MARINE ENGINEERING COURSE.

The common concern is that the Minimum Standards of the International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978 have to be met by training in maritime academies all over the world. The faculties of the academies concerned have to have certain common qualification in order to be able to offer such training.

Inadequacies in staff qualifications and lack of equipment within a maritime institution might form a barrier to the implementation of the STCW Convention Standards.

Why the need of an updated curriculum for marine engineer officers ? Today's Seafarers are likely to work in small, multinational teams and will constantly have to increase their use of the most sophisticated technology. These facts, together with the pressures of safety and the environment, are making growing demands on the standards of training and education provided all over the world.

On the other hand, Mozambique as a maritime nation needs

1. To increase the employment potential in the maritime field.
2. To eliminate the dependence in foreign maritime expertise.
3. To meet the highest standards of safety and manning of ships.

5.1 OBJECTIVES

The purpose of education should be to bring each individual through training in good habits to develop the capacity to choose the right conduct for themselves and to provide guidance for others (RICHARD ALDRICH, 1982).

By the end of the course, the graduates will be provided with sufficient updated and depth knowledge of the fundamentals of engineering science, which will form basis for the essential understanding of watchkeeping practice as well as commanding procedures on board merchant vessels.

5.2 TEACHING STAFF REQUIREMENTS

For the curriculum to be implemented efficiently, considerable attention must be paid to the availability and use of properly qualified lecturers, supporting staff, updated technical material and other reference.

The Senior Lecturers for professional maritime subjects must hold a Chief Engineer Certificate of Competency plus a Degree in Maritime Education and Training.

Junior Lecturers for professional maritime subjects must hold a Chief Engineer Certificate of Competency.

Lecturers for mechanical engineering subjects should have a high Degree in Mechanical Engineering.

Lecturers for marine electro-tecnology must have a Degree in Electro-Mechanical Engineering plus approved experience on board ship or electrical power installations.

Both Assistants and Technicians for related subjects should posses acceptable qualifications and approved sea experience.

Lecturers for general subjects must have high Diploma in General Science or a Bachelor Degree plus approved teaching experience.

5.3 PROPOSED ENGINEERING CURRICULUM.

In this section, apart from three months pre-sea training, the three phases four years Engineering Program is proposed. The TABLES 5.2 (A,B) and 5.3 (A,B) illustrate the content of the Actual Engineering Program at Nautical School and the Proposed Engineering Program respectively.

From TABLE 5.2 (A,B) it can be clearly seen that a considerable amount of hours are devoted to the professional subjects as well as to the supporting subjects. Concerning academic and general subjects, extra hours are also spent in Mathematics, Maritime English and Workshop Practice, which to some extent, makes sense. However, this considerable amount of hours makes the course program very long relative to the world-wide four years.

The TABLE 5.3 (A,B) shows the content of the Proposed Engineering Program, farely designed with special consideration to the professional as well as to the supporting, academic and general subjects hours. The subjects were reorganized and more clearly stated to better explain their content. The "extra" hours are removed to permit the four years course program. (TABLE 5.1).

TABLE 5.1

PROPOSED TRAINING SCHEME

	PRE-SEA	1ST PHASE	2ND PHASE	3RD PHASE
COURSE	3 MONTHS	2 YEARS	1 YEAR	1 YEAR
NAVIGATION	SEA TRAINING	SCHOOL	SEA TRAINING	SCHOOL
ENGINEERING	SEA TRAINING	SCHOOL	SEA TRAINING	SCHOOL
RADIO	SEA TRAINING	SCHOOL	SCHOOL	PRACTICE

TABLE 5-2 (A) ACTUAL ENGINEERING PROGRAM.

INSTITUTION: NAUTICAL SCHOOL OF MOZAMBIQUE.
PROGRAM OF STUDY: MARINE ENGINEERING.
DURATION: 4 1/2 YEARS (SEA TRAINING INCLUDED).
COMPETENCY: 3RD ENGINEER OFFICER + Bso DIPLOMA.

GROUP 1
PROFESSIONAL SUB.

SUB. TITLE	HOURS
Ship maintenance.	324
Auxiliary machinery	310
Operation & maintenance of ship mach.	180
Boilers & turbines.	90
Oil & lub.	54
Marine electrot.	288
Automation	180
Marine refrigeration	144
Course project	162
	1732
	34.78

GROUP 2
SUPPORTING SUB.

SUB. TITLE	HOURS
Thermodynamics	198
Engin. drawing	144
Engin. science	108
Strenght of mater.	108
Naval architeo.	144
Basic of navigation	54
SAFETY	288
Electricit & electron	216
	1512
	30.36

GROUP 3
GENERAL SUBJECTS

SUB. TITLE	HOURS
Physical fitness	144
General english	72
Portuguese language	72
Maritime english	216
Maritime economics	54
Maritime law	108
	666
	13.34

GROUP 4
ACADEMIC SUBJECTS

SUB. TITLE	HOURS
Mathemat.	216
Physics	144
Chemistry	72
Computer	72
	504
	10.10

SAFETY: First aid, safety personnel and fire-fighting.

CONTINUED.....

TABLE 5-3 (A) PROPOSED ENGINEERING PROGRAM.

INSTITUTION: NAUTICAL SCHOOL OF MOZAMBIQUE.
PROGRAM OF STUDY: MARINE ENGINEERING.
DURATION: 4 YEARS (SEA TRAINING INCLUDED).
COMPETENCY: 3RD ENGINEER OFFICER + Bso DIPLOMA.

GROUP 1
PROFESSIONAL SUB.

SUB. TITLE	HOURS
Marine Diesel Engines	300
Auxiliary Machinery.	279
Marine P. Plant Operation & Maintenance	240
Marine Elec & Electron.	276
Automation	120
Marine Refrigeration	72
Naval Arch	60
Stability	60
Ship Struc.	36
Resistance & Propul.	36
Basic of Navigation	36
TOTAL	1466
%	36.68

GROUP 2
SUPPORTING SUB.

SUB. TITLE	HOURS
Thermodynamics & Heat Transfer.	192
Eng. Drawing.	144
Tech. of Materials.	94
Mar. Eng. Materials.	36
Strength of materials.	60
Marine eng. development	36
Fluid mec.	36
Electricity	72
Electronics	60
SAFETY.	240
Computer science	72
	1050
	26.28

GROUP 3
GENERAL SUBJECTS

SUB. TITLE	HOURS
Port. Language.	62
Gen. Engl.	60
Physical Education.	72
Inter. mar. Conventions	36
Maritime Law.	36
Maritime English.	164
Mar. econom	48
Mar. Admin.	36
	514
	12.28

GROUP 4
ACADEMIC SUBJECTS

SUB. TITLE	HOURS
Mathematics	144
Physics.	204
Chemistry	72
Statistics	36
	456
	11.41

CONTINUED....

SAFETY: First aid, safety personnel and fire-fighting.

CONTINUED....

TABLE 5-2(B)

GROUP 5 APPLICAT. & PRACT	
SUB.TITLE	HOURS
Machine Tools	180
Fabrication & welding	144
Workshop practice	252
	576
	11.54

CONTINUED....

TABLE 5-3(B)

GROUP 5 APPLICAT. & PRACT	
SUB.TITLE	HOURS
Machine Tools	164
Hand & po_ wer tools	144
Fabrication & welding	82
Workshop practice	120
	510
	12.76

To be qualified as an engineer officer in charge of a watch, second and chief engineer officers, the candidates must undergo the Proposed Engineering Curriculum, which comprises three phases.

5.3.1 FIRST PHASE.

The first phase is two years, which are devoted to basic engineering knowledge and safe working practice. The objective is that by the end of second year the students must acquire knowledge and skills to perform adequate sea training, as stated in Regulations III/1 and III/4 of the STCW Convention. This will enable the students to gain the maximum benefit from seagoing experience with safe working practice.

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 1

FIRST YEAR	FIRST SEMESTER		18 WEEKS
COD	SUBJECTS		HOURS
1E01	PORTUGUESE LANGUAGE		60
1E02	MATHEMATICS	I	72
1E03	PHYSICS	I	72
1E04	INDUSTRIAL CHEMISTRY		72
1E05	PHYSICAL EDUCATION		36
1E06	ENGLISH LANGUAGE		60
1E07	COMPUTER SCIENCE	I	36
1E08	ENGINEERING DRAWING	I	72
1E09	HAND & POWER TOOLS	I	72
1E10	MARINE ENGINEERING MATERIALS		36
1E11	SAFETY PERSONNEL		36
1E12	FIRST AID		36
1E13	BASIC FIRE FIGHTING		36
1E14	LIFE - SAVING APPLIANCES		36
TOTAL 1E			720

1E = First year, Engineering course.

1 hour lecture = 45 min.

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 2

FIRST YEAR	SECOND SEMESTER		18 WEEKS
COD	SUBJECTS		HOURS
1E02	MATHEMATICS	II	72
1E03	APPLIED PHYSICS	I	72
1E06	MARITIME ENGLISH	I	56
1E08	PHYSICAL EDUCATION	II	36
1E05	ENGINEERING DRAWING	II	72
1E09	HAND & POWER TOOLS	II	82
1E15	MACHINE TOOLS	I	82
1E16	MARINE DIESEL ENGINES	I	72
1E17	AUXILIARY MACHINERY	I	72
1E18	MARINE ELECTROTECNOLOGY	I	72
TOTAL 1E			688

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 3

SECOND YEAR	THIRD SEMESTER		18 WEEKS
COD	SUBJECTS		HOURS
2E09	PHYSICAL EDUCATION	III	36
2E06	MARITIME ENGLISH	II	36
2E19	THERMODYNAMICS	I	72
2E20	FLUID MECHANICS		36
2E16	MARINE DIESEL ENGINES	II	72
2E17	AUXILIARY MACHINERY	II	72
2E18	MARINE ELECTROTECNOLOGY	II	36
2E21	MARINE ELECTRONICS	I	60
2E22	MARINE ENG. MAINTENANCE	I	60
2E15	MACHINE TOOLS	II	80
2E23	FABRICATION & WELDING		80
2E24	ADVANCED WORKSHOP PRACTICE		60
TOTAL 2E			700

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 4

SECOND YEAR	FOURTH SEMESTER		18 WEEKS
COD	SUBJECTS		HOURS
2E06	MARITIME ENGLISH	III	36
2E07	COMPUTER SCIENCE	II	36
2E25	NAVAL ARCHITECTURE		72
2E19	THERMODYNAMICS	II	60
2E26	STRENGTH OF MATERIALS		60
2E16	MARINE DIESEL ENGINES	III	60
2E17	AUXILIARY MACHINERY	III	72
2E28	MARINE P. PLANT OPERATION		60
2E27	PROPERTIES OF FUEL & LUB.		36
2E18	MARINE ELECTROTECNOLOGY	II	60
2E21	MARINE ELECTRONICS	II	72
2E28	INSTRUMENTATION & CONTROL SYS.		60
TOTAL 2E			684

5.3.2 SECOND PHASE.

SEA TRAINING.

The objective of sea training is to familiarize the students with marine environment as well as with the different types of marine power installations on board ships. During sea training the trainees will be required to perform a sea project, which will be reported to the department concerned. The sea project will comprise tasks related to the main engine performance as well as auxiliary machinery. This will greatly benefit insight in the processes of operating and maintaining the various marine power installations, according to the STCW Convention requirements on Watchkeeping Duties.

5.3.3 THIRD PHASE

The last year of the course is mostly devoted to the administrative and management studies. In other words, the students are provided with knowledge and skills for commanding purpose and high responsibility. By the end of this phase the final course examinations should be held and if successfully the course certificate should be issued to the graduates. Provided that the sea training requirements were fulfilled the Ministry of Transport and Communications should issue the Watchkeeping Certificates of Competency to the graduates.

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 5

FOURTH YEAR	SEVENTH SEMESTER		18 WEEKS
COD.	SUBJECTS		HOURS
3E29	BASIC OF NAVIGATION		60
3E30	SHIP STRUCTURE		36
3E31	SHIP STABILITY		48
3E32	RESISTANCE & PROPULSION		36
3E19	THERMODYNAMICS & HEAT TRANSFER		60
3E28	MARINE P. PLANT OPERATION		72
3E16	MARINE DIESEL ENGINES	IV	60
3E17	AUXILIARY MACHINERY	IV	60
3E18	MARINE ELECTROTECNOLOGY	III	60
3E21	MARINE ELECTRONICS	II	60
3E28	MARINE AUTOMATION		60
3E33	MARINE REFRIGERATION		72
3E24	ADVANCED WORKSHOP PRACTICE		60
TOTAL 3E			744

TABLE 5.4

PROPOSED ENGINEERING CURRICULUM. 6

FOURTH YEAR	EIGHTH SEMESTER	17 WEEKS
COD	SUBJECTS	HOURS
3E06	MARITIME ENGLISH	36
3E34	INTER. MARITIME CONVENTIONS	36
3E35	MARITIME LAW	36
3E36	MARITIME ECONOMICS	48
3E37	MARITIME ADMINISTRATION	36
3E38	SHIPBOARD MANAGEMENT	36
3E39	TECHNOLOGY OF MATERIALS	94
3E40	MECHANICAL VIBRATIONS	36
3E41	MARINE STATISTICS	36
3E42	MARINE ENGIN. DEVELOPMENT	36
3E43	CONTROL & PREVENTION OF POLLUTION	36
3E44	ADVANCED FIRE-FIGHTING	36
3E45	COURSE PROJECT	180
TOTAL 3E		682

5.4 SYLLABUS OBJECTIVES.

5.4.1 THERMODYNAMICS & HEAT TRANSFER

Demonstrate sufficient theoretical knowledge to carry out that part of a Watchkeeping Engineer's responsibilities concerning the efficient operation of Marine Heat Engines and Thermodynamic Processes such as:

1. Properties.
2. Energy systems and change.
3. Heat transfer.
4. Vapours.
5. Gas Laws.
6. Thermodynamic processes.
7. Work transfer.

5.4.2 ENGINEERING DRAWING.

Demonstrate knowledge on engineering drawing produced to International Standards and Conventions as well as to be able to produce drawings of an adequate Standards for the manufacture of machine components.

5.4.3 HAND & POWER TOOLS

Demonstrate sufficient knowledge and skills in the use of tools such as: Hand tools, sharpening power tools, powered hand tools, measuring tools, sharpening drills, and to carry out or supervise the work encountered in maintenance or repair on board ships.

5.4.4 MARINE DIESEL ENGINES.

Demonstrate theoretical knowledge and practical skills for operation and maintenance of diesel engines and auxiliary machinery as a unit. This also includes an operation of the marine gas turbines and marine steam engines as well as heat engine cycles and energy inputs efficiency.

5.4.5 MARINE ENGINEERING MAINTENANCE.

Demonstrate knowledge and skills in the principals of the practical operational aspects such as: Desmontling procedures, the use of maintenance tools, inspection techniques, repair and replacement, reassembling and test running of ship machinery.

5.4.6 MARINE ELECTROTECNOLOGY.

Demonstrate theoretical knowledge and sufficient practical skills to carry out duties of an Engineer Officer in a safe manner in the engine room. This concern basically the alternating and direct currents, the alternating and direct current generators and motors, electrical power installations and maintenance of electrical equipment.

5.4.7 FABRICATION AND WELDING.

Acquire knowledge and gain experience in the use of different types of welding machines as well as practice in fabrication, joining and metal cutting. Selection of correct welding equipment and materials and the use of correct welding techniques and safety equipment.

5.4.8 MACHINE TOOLS.

Acquire skills and gain experience in :

1. The use and maintenance of Lethes and shaping machines.
2. The maintenance of machine tools.
3. The correct procedures for setting up and securing work for a given machining operation.
4. The use of safe working practices.

5.4.9 AUXILIARY MACHINERY.

Demonstrate theoretical knowledge on pumps and pumping systems, main and auxiliary boilers, heat exchangers, evaporators and distillers, air compressors, refrigeration machinery, mooring equipment, cargo handling equipment and stearing gear systems as deck machinery.

5.4.10 MARINE POWER INSTALLATIONS.

Operation of marine power installations, engine performance, engine components, engine control, auxiliary systems, preparing, starting, reversing and changing over the generators.

5.4.11 TECHNOLOGY OF MATERIALS.

Demonstrate knowledge on understanding the behaviour of materials in general used in ships under varying conditions of loading, this include the processes of fabrication, normalizing.hardening, tempering and bonding as well identifying types of failure and remedy.

5.4.12 COMPUTER SCIENCE.

The use of computer: MS-DOS, Word-perfect and Spreadsheet. Introduction to the Computer_Aided Drafting and Design as well as Engineering Graphics.

The curriculum was designed based on IMO Model courses 7.02, 7.04, appendixes to Regulations III/2, III/3 and III/4 of the STCW 78 Convention and recommendations.

5.5 CERTIFICATION

After successful completion of the course, the cadets will be awarded the Bsc diploma in Marine Engineering and a Watchkeeping Certificate of Competence.

To obtain the Highest Certificate in Marine Engineering the Officers are required to complete five years sea service respectively 36 months as a Watchkeeping Officer and 24 months as Second Officer, followed by the respective Certificate of Competency Examinations after sea service is completed for each rank.

CHAPTER 6

RECOMMENDATIONS

The achievement of maritime education and training objectives, involves particular attention to policies, systems, management and control and incorporates internal quality assurance mechanisms and independent external quality audits, to check that the objectives (Standards) are being accomplished at all levels of the training activities.

This study wishes to offer the following recommendations for the pertinent parties to consider and perhaps implement. The pertinent parties, such as, Maritime Administration, the Shipping Community and the Nautical School must come together and produce better solutions to improve maritime education and training.

There must be a clear commitment by the Maritime Administration _ Government, which means full involvement with IMO Committees and following up the STCW changes.

A consultative body, able to advise the school community in academic matters should be identified and appointed. Such body should comprise among others, the representatives of Maritime Administration, Shipping Companies, Seafarers and Agencies as well as representatives of Ministry of Education.

Teaching staff seems to be the most sensitive element within the Maritime Education and Training of Seafarers, all over the World. Experience shows that maritime institutions have always had problems in maintaining a proper teaching personnel. However, it should be kept in mind that, the success of the school and its reputation within the maritime industry are closely related to a well qualified and highly motivated teaching staff.

The School Administration should ensure that all staff are well oriented, trained and motivated to accomplish the school goals and objectives.

The curriculum design of each course must be relevant and objective to meet not only the basic technical knowledge, but also the needs of the shipping industry as well as the growing demands of the new technology.

The candidates should be given the opportunity to know in advance, before the enrollment, all about the Nautical School itself as well as the offered courses and their curriculums, so that the candidates can exchange views with School Departments and Administration.

The aim of the library should be to support the teaching staff in form of reference and research. It should also be a source to provide advise to the learners and to other interested personnel.

The school should seek guidance and assistance from the University and other technical institutions with more experience within the educational field.

The sea training for the cadets should be designed in a such way to generate confidence and develop technical, practical and social knowledge for highly trained and educated marine officers. Cadets sea training feedback as well as an officers performance on board ships should be taken into account for the purpose of school performance evaluation.

Good relations and cooperation should be encouraged with the land based maritime industry so that the learners can be involved with management, maintenance, repair and dry dock.

Regarding examination and certification of seafarers, there must be a strong link between Maritime Administration and MET institution. In most of the cases, examination of seafarers is conducted within a Maritime Administration, but cases are also found where this is performed by the MET institutions, provided that the institutions are well managed and equipped with proper knowledgeable teaching staff.

The primary objective of this study was to identify the strengths and weakness within the Mozambique maritime education and training of seafarers. The author hopes that, the results of this study will, to a certain extent, benefit those, who are closely related to maritime educational policy.

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