1993

Seafarers education and training in the Philippine setting

Augusto Uriarte Escolano
WMU

WORLD MARITIME UNIVERSITY
Malmö, Sweden

SEAFARERS EDUCATION AND TRAINING IN THE PHILIPPINE SETTING

by

AUGUSTO URIARTE ESCOLANO
The PHILIPPINES

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

Degree of

Master of Science
in
Maritime Education and Training
(Engineering)

1993

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature).....
(Date).....October 22, 1993.....

Supervised by:

Kenji Ishida
Course Professor (MET-E)
World Maritime University

Assessed by:

Peter Muirhead
Course Professor (MET-N)
World Maritime University

Co-assessed by:

Donald Ferguson
Commandant of Midshipmen
United States Merchant MarineAcademy

SEAFARERS EDUCATION AND TRAINING IN THE PHILIPPINE SETTING

For my mother

and for Bessie and our unborn child

ACKNOWLEDGEMENTS

First of all I would like to thank the Almighty God for all His Graces and Blessings and for making me what I am today.

I should like to record my sincerest thanks and deep gratefulness to Prof. Kenji Ishida, who, as supervisor provided me with excellent guidance, tolerance and kindness during my dissertation preparation and studies at the World Maritime University.

I want to thank Prof. Peter Muirhead who assessed my dissertation who, in one way or another, presented us with relevant information and materials regarding MET.

I wish to thank Capt. Donald Ferguson, who co-assessed my dissertation for providing me with useful advice and suggestions. I should like to acknowledge the invaluable suggestions of Capt. William McMullen, also of the USMMA, for giving me enlightenment during the preparation of this dissertation.

I am indebted to the Government of Luxembourg for their generosity in sponsoring my studies and to the National Maritime Polytechnic (my employer) for giving me this opportunity of studying at the World Maritime University.

Considerable amount of material for this dissertation was drawn heavily from the field trips undertaken by the course group in Europe and America, and from the good-hearted visiting professors from the various maritime institutions, maritime organizations and maritime agencies.

I would also like to appreciate the Executive Director of the National Maritime Polytechnic, Mr. Renato B. Palomo, and Mr. Genis Murallos,

Head of the Maritime Training Division. Likewise, I also would like to thank my associates who have in one way or another assisted me in providing me with the materials needed for the realization of this project. They are:

Ms. Nissa C. Espiritu, PRPD, NMP;
Ms. Maria Jane M. Baranda, PRPD, NMP;
Mr. Pablo O. Santos, Jr., MTD, NMP;
Ms. Rosita Magpantay, TPME, DECS; and
Mr. Julito Haboc, POEA.

While it is impossible to acknowledge by name all the people who have helped me in completing this project, I would like to thank the Staff of the University Library who put up with me. Also to my classmates who had been very tolerant with me and whole-heartedly shared their experiences, knowledge's, jokes and afternoons with their families. To all my Filipino colleagues at the University and all my friends in Malmö, especially Bo and Erlinda Sörensson, who generously and unselfishly supported my wife and me.

To my parents Mr. & Mrs. Jaime O. Escolano and Eugenia Uriarte Escolano, for their unfailing and undying support in all my endeavors.

Above all, to my wife, Bleselda, for her understanding, patience, tolerance, sacrifices, support and for bearing our unborn child. To him I dedicate this humble project.

To all of you, I share my success !!!

AUGUST

ABSTRACT

About one in every four seafarer worldwide is a Filipino. Filipino seafarers had their formal Maritime Education and Training as early as 1820 when the Escuela Nautica de Manila was established. Since then, the maritime profession became attractive to Filipinos because of the foreign earnings that they derive from this profession.

As of present, there are now sixty-five (65) Maritime Institutions in the Philippines, but, as with other developing countries, the Philippine Maritime Institutions are faced with a predicament of coping with the technological advances, automation, shipboard computerization and crew reduction in the Maritime Industry. The Maritime Institutions have no adequate and sufficient equipment and facilities.

Role integration (between the Deck Department and the Engine Department) is another expansion in the maritime profession. Future seafarers are expected to be multi-skilled, performing interdisciplinary tasks.

These developments have led to two recommendations. The first is the establishment of Regional/Zonal Re-training Centers to re-educate seafarers to be able to cope up with recent changes, developments and technologies in the maritime industry.

The other recommendation is to introduce a Ships Officer Program, integrating the functions of both the Deck Department and the Engine Department with emphasis on electronics and automation.

LIST OF FIGURES

LIST OF MAP

LIST OF TABLES

LIST OF ABBREVIATIONS

BHP	Brake Horse Power
BSC	Basic Seaman Course
BScME	Bachelor Of Science in Marine Engineering
BScMT	Bachelor of Science in Marine Transportation
BScNAME	Bachelor of Science in Naval Architecture and Naval Architecture
BScNSTO	Bachelor of Science in Nautical Studies with Technical Options
CISO	Conference of Interisland Shipowners Association
CMIP	Chamber of Maritime Industries of the Philippines
DACUM	Developing A Curriculum
DECS	Department of Education, Culture and Sports
DOLE	Department of Labor and Employment
DOTC	Department of Transportation and Communications
EGPS	Enriched Guidelines, Policies and Standards for Maritime Education Programs
FAAP	Federation on Accreditation Agencies of the Philippines
FAME	Filipino Association of Maritime Employers
FAPE	Funds for Assistance for Private Education

GMDSS	Global Maritime Distress and Safety System
GRT	Gross Registered Tons
ILO	International Labor Organization
IMA	Iloilo Maritime Academy
IMO	International Maritime Organization
MARINA	Maritime Industry Administration
MET	Maritime Education and Training
NCEE	National College Entrance Examination
NCR	National Capital Region
NMP	National Maritime Polytechnic
PAMI	Philippine Association of Maritime Institutions
PC	Personal Computer
PCG	Philippine Coast Guard
PISA	Philippine Interisland Shipping Association
PMI	Philippine Maritime Institute
PMMA	Philippine Merchant Marine Academy
POEA	Philippine Overseas Employment Administration
PRC	Professional Regulations Commission
SOLAS	Safety of Life at Sea

STCW 78	International Convention on the Standards of Training. Certification and Watchkeeping 1978
TPME	Technical Panel for Maritime Education
UMS	Unmanned System
VLCC	Very Large Crude Carrier

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

1.1 Importance of the need of Introducing a Ship's Officers Program in the Philippine Maritime Education and Training.

The conventional Maritime Education and Training has made its recognition in the international shipping industry by providing a steady supply of supply well-trained seafarers every year. Although the performance of these graduates speaks well of the kind of training they had in the various maritime institutions, the industry must not be content with these accomplishments but must also adapt itself to the technological innovations and modern applications now in use.

The Government and the maritime institutions are aware of the fact that Filipino seafarers should have the right kind of training to maintain their competitiveness in the world market. Such training usually involves familiarity with the modern practices, specialization in a key area, or broadening of knowledge in order to meet the new challenges.

Known as the Ship's Officers Program, the new curriculum involves the integration of both the nautical and the marine engineering subjects and the addition of hydraulics, pneumatics, and electronic control subjects. The conventional program that has been adopted to the present, involves a curricula limited only to the Bachelor of Science in Marine Transportation (BScMT), the Bachelor of Science in Marine Engineering (BScMarE), the Bachelor of Science in Naval Architecture and Marine Engineering (BscNAME) and the Basic Seaman's Course (BSC). Graduates of the Ship's Officers Program will be conferred a degree of Bachelor of Science in Nautical Studies with Technical Options (BScNSTO).

1.2 To provide a continuous supply of well-trained maritime personnel at various levels to maintain and operate the national and the international fleet.

As the maritime industry expands, more emphasis is directed towards training and career development of its manpower component. Up to this time, programs and projects being implemented both by the Government sector and the private entities are geared towards the development of Filipino seafarers boarding international vessels to enhance their employment acceptability in the international labor market.

However, the Philippine maritime industry has been faced with various problems in the safe operation of its inter-island vessels. Noteworthy to mention are sea accidents and environmental pollution that are mostly caused by human error, thus realizing the importance of the domestic seafarers as the vital element of the shipping industry. Thus, the Government and the shipping executives should work hand-in-hand in creating and implementing programs meant to help the domestic seafarers attain a more professional and brighter career.

The maritime education program was introduced in the Philippines to produce qualified manpower for the country's maritime industry. The program was geared to the production of professional graduates who would serve as ratings, cadets, and officers of deck and engine departments especially on ocean-going vessels.

There are now sixty-five (65) maritime schools offering maritime education in the Philippines, both public and private.

The Department of Education, Culture and Sports (DECS) and the Technical Panel for Maritime Education (TPME) conducted a survey and found out that most of the maritime institutions are far

below the standard requirements set by the DECS. Although maritime schools strove hard in their own ways for excellence, their facilities and resources are limited. Sophisticated equipment for training is not readily available in the market as most are imported. Connections with the shipping industry have misconceptions about the maritime schools raking in profits from their graduates. Research and development were not given priority to develop whatever opportunities there might have been for maritime education.

The objective of the dissertation is to design a Maritime Education and Training Program. The program would upgrade the professional skills, abilities, and knowledge of the Filipino seafarer that is geared towards the integrated ship's officers (both nautical and engineering) program. This is in consonance with the recent developments in ships' automation, crew reduction, and rationalization. It is also intended that in setting up this program, less sophisticated facilities/equipment will be used in order for the sixty-five maritime institutions to be able to upgrade their maritime curricula and facilities.

CHAPTER II

THE PRESENT MARITIME EDUCATION AND TRAINING IN THE PHILIPPINES

2.1 PHILIPPINE MARITIME EDUCATION AND TRAINING

The maritime education and training program in the Philippines was introduced to produce qualified personnel for the country's maritime industry. The program was geared to the direction of professional graduates who serve as ratings, cadets, and officers of the deck and engine departments mainly in ocean going vessels.

Eighty years after the creation of the Philippine Nautical School in 1913, there are now sixty-five (65) maritime institutions offering maritime education and training, both privately and governmentally owned.

The Department of Education, Culture and Sports (DECS) and the Technical Panel for Maritime Education (TPME) conducted an appraisal and found out that most of the maritime institutions are far below the criterion set by the DECS. Although, the maritime institutions have strive hard in their own ways for excellence, their facilities and resources are limited. Advanced equipment for training is unavailable in the domestic market. These are imported and are heavily taxed by the Bureau of Customs upon entry. Linkages with the shipping industry erroneously resent the schools for raking profits from their graduates. Research and development were not given importance to generate whatever opportunities there might have been for maritime education.

2.2 THE EXISTING MARITIME EDUCATION PROGRAMS

There are four (4) maritime education programs offered by the private and government-owned schools approved by the Department of Education, Culture and Sports (DECS) [1]. They are as follows:

i) BACHELOR OF SCIENCE IN MARINE TRANSPORTATION (BScMT).

The program is designed to produce appropriate, adequate and trainable graduates in Navigation and Seamanship. After completing the apprenticeship, the graduates will be capable of performing specialized tasks in their field of study on board merchant marine vessels. It consists of six semesters of three academic school years totaling 168 Credit Units, and one year of apprenticeship training on board national or international sea-going merchant vessels with at least 250 Gross Registered Tons (GRT) which is equivalent to 40 Credit Units.

ii) BACHELOR IN SCIENCE IN MARINE ENGINEERING (BScME).

The program is designed to produce appropriate, adequate and trainable graduates in the operation, care, and maintenance of marine propulsion units and auxiliary machinery. After completing apprenticeship, the graduates will be capable of performing specialized tasks in their field of study. It consists of six semesters of three academic school years totaling 168 Credit Units, and one year of apprenticeship training on board national or international sea-going merchant ship of at least 250 Brake Horse Power (BHP) or shipyard training that is equivalent to 40 Credit Units of academic study.

iii) BACHELOR OF SCIENCE IN NAVAL ARCHITECTURE AND MARINE ENGINEERING (BScNAME).

The program is designed to produce appropriate, adequate and trainable graduates in ship designs, engine horse-power requirements, engine installations, ship repair and maintenance, marine survey, ship inspection, and other related fields. It consists of ten (10) semesters of five academic years, totaling 210 Credit Units.

iv) BASIC SEAMAN COURSE (BSC).

The BSC Program is designed to produce graduates who could perform myriad tasks on the context of structural change in fleet composition due to significant development or rising level of sophistication of propulsion machinery, navigational equipment, cargo handling equipment and managerial development towards on board automation concerning operation and management of ships. The graduates will be capable of performing specialized tasks after completing the period of on-the-job training. It consists of two semesters of one academic year or 360 hours of basic training and 840 hours of major training in the field of specialization including shipboard training on board national or international merchant ship of at least 250 GRT or 250 BHP.

2.3 THE GUIDELINES; POLICIES AND STANDARDS FOR MARITIME EDUCATION

2.3.1 AUTHORIZATION.

These Policies, Standards and Guidelines for Maritime Education shall cover the following courses:

1. Bachelor of Science in Marine Transportation (BScMT).

2. Bachelor of Science in Marine Engineering (BScME).

3. Bachelor of Science in Naval Architecture and Marine Engineering (BScNAME).

4. Basic Seaman Course (BSC) - (General Purpose Rating).

4.1 Specialized in Engine Personnel Training

4.2 Specialized in Deck Personnel Training

2.3.2 MISSION STATEMENT.

The maritime education program in higher education shall aim to produce graduates whose knowledge, attitudes and skills are sufficient for starting and pursuing a professional career or advanced studies in any maritime field of specialization. Likewise, the maritime education program shall aim to equip the students with the knowledge of the trade, ethics, and discipline necessary to adjust to the required professional values in particular and the Filipino national identity in general.

2.3.3 ADMINISTRATION.

There shall be a College/Department of Maritime Education to administer the Following Departments :

1. Bachelor of Science in Marine Transportation

2. Bachelor of Science in Marine Engineering

3. Bachelor of Science in Naval Architecture and Marine Engineering

4. Basic Seaman Course

The administrators of the Maritime Education courses, to qualify for the position, must possess the proper academic degrees, outstanding experiences and credentials as stipulated in the minimum standard requirements of the different disciplines.

A Faculty Development Program for professional advancement of the faculty members must be provided through :

1. A Scholarship Grant,
2. Tuition Fee Supplement/Discount, and
3. In-Service Training.

There should be a faculty manual containing information and policies such as :

1. Concrete recruitment policy for faculty members.

2. Maximum utilization and adoption of the following teaching methods:

   a. Lecture Method
   b. Seminar Method
   c. Demonstration/Drill Method
   d. hands-on Exercises
   e. Class Interaction
   f. Project/Class Study Method

3. Concrete Faculty Evaluation Scheme

4. Policy of retention and separation

Faculty-Student Ratio

1. Lecture 1 : 50
2. Laboratory 6 Students per working group (at least 5 groups in a class) 1 : 30

2.3.4 FACULTY.

The faculty members of the Maritime Education Institution must be holders of Master's Degree and with at least a Bachelor's Degree in their field of specialization with corresponding training and experience. They should teach the subjects of their specialization only.

Faculty members who are handling or teaching maritime professional subjects shall be holders of Marine Officer license and corresponding advanced training and experiences in their field of specialization.

As a rule, the regular full-time load of a faculty member is twenty-four (24) units per week. A faculty member with an outstanding teaching performance may handle twelve (12) or more hours per week provided that subject preparation is limited to not more than two.

A part-time instructor employed elsewhere may carry a total of not more than 12 units in all schools in which he teaches.

2.3.5 CURRICULUM.

The curricular structure and description of the courses for the different Maritime disciplines shall be observed by the administrators in general, and the faculty members in particular.

The curricular requirements generally consist of minimum and maximum credit units. The minimum credit units are the required earned units for graduation. However, the institution can expand or enrich the curricular requirements provided the additional credit units will not go beyond the grand total maximum credit units.

Deviation from any of the prescribed curricular program shall be referred to the DECS for approval.

2.3.6 FACILITIES and RESOURCES.

Every Institution offering the maritime education courses shall maintain the campus owned by the school according to the general rules on sites of schools as follows:

A. CAMPUS AREA

a. One half hectare of land for a school with an enrollment of 500 students or less.

b. One hectare of land for a school with an enrollment of 510 to 1000 students.

c. Two hectares of land for a school with an enrollment of 1,001 to 1,500 students.

d. Three hectares of land for a school with an enrollment of 1,501 to 2,000 students.

B. PHYSICAL FACILITIES AND EQUIVALENT

a. School buildings should comply with the appropriate zoning and building regulations of concerned government agencies.

b. The laboratory floor space , especially for shops where there are big machines/engines must be adequately spacious to accommodate the students and for safety measures.

c. The classroom floor area should be of Philippine Education Standard of at least 56 square meters to conveniently accommodate a maximum class of 50 students.

d. Facilities for adequate ventilation and illumination for classrooms, laboratories, shops and library should always be maintained.

C. SUPPORT SERVICES.

a. Health Services. There should be adequate facilities in medical and dental clinics to serve the needs of the faculty, the students and the personnel of the school.

b. Student's Personnel and Placement Services. There should be an auditorium or multi-purpose hall for conferences, conventions and seminars. Facilities for guidance and counseling, placement of graduates, and for recreation should be provided and maintained in the school.

c. Field Trip and On-the-Job Training. Each Institution should provide a program for educational field trips and on-the-job training opportunities for its maritime students in accordance with these Policies and Standards for Maritime Education Courses.

2.3.7 SHIPBOARD TRAINING and FIELD TRIPS.

Each Institution should provide a program for sea trips, port and shipyard visits and other educational opportunities for its maritime students according to these policies and standards. Institutions offering maritime programs that require apprenticeship or thesis writing should provide permanent staff who will monitor the activities or requirements of such program.

2.3.8 LOGBOOK/THESIS.

An accomplished logbook/thesis must be submitted to the Superintendent or Dean by each of the cadets/students immediately after completion of his/her apprenticeship as required by the curriculum, which will be the basis for the graduation and approval of his/her special order to be issued by the DECS. Each Maritime Institution must have a permanent training staff to assist the students to be placed on board ship and to provide pre-shipboard training orientation and to monitor the training of their student.

2.3.9 LIBRARY.

Every Maritime Institution must have a library with books and materials that, with quality and quantity, are reasonably adequate for effective maritime studies in depth and breadth of coverage, are representative of authority in the various disciplines, extent of correlatives, and recency of editions, depending upon the field of maritime concentration shall respond to the changing and growing needs of maritime studies and research, as well as to the changes in institutional maritime policies and standards. Audio-visual facilities and materials are some of the most effective resources in the library for efficient instruction.

At least ten percent (10%) of the professional and cultural books in the library should be in Filipino, Oriental and/or Asian.

Besides books, the library resources should include many appropriate professional publications such as: journals, bibliographies, manuals, monographs, serials, book-bound issues of reputable professional, and cultural journals and ten (10) video tapes per one hundred students for every discipline.

2.3.10 RESEARCH and EXTENSION SERVICES.

All faculty members of all maritime courses should engage in research. This research may include development of teaching materials or courses. The research activities of the faculty may extend outside the school in consortium or research cooperation with other institutions. The institutes may provide some form of research grants to the faculty and students in maritime education. The department should establish linkages with the industries and government research institutions.

The end-results of the research projects should be reported in departmental seminars or in conferences with professional organizations or published in a reputable journal.

2.3.11 ADMISSION, SELECTION and PROMOTION.

Maritime Institutions should observe the following admission and selection criteria:

a. Student Admission Requirements:

- Official High School Grades
- National College Entrance Examination (NCEE) Passing Mark.
- Transfer Credentials (Transferee)

b. Entrance Examination and Structured Interviews

c. Physical Examination as to medical fitness, particularly eyesight and hearing.
d. Adopted criteria for the selection of honor students.

Licensed Marine Officers who wish to enroll in the degree granting programs (BScMT or BScME) may be exempted from the apprenticeship requirements, provided they satisfy the other curricular requirements and are able to submit the following documents to the Dean/Head of the program who in turn recommends to the Registrar for credit:

a. Marine Officers License Certificate.
b. Certificate of Sea Service as Watchkeeper or as Officer on board a ship with the minimum number of tonnage or horsepower as required by law.

The Maritime Institutions should check that, each student shall satisfy all requirements of these policies and standards before being awarded a degree in Maritime Education.

2.4 THE PHILIPPINE EDUCATIONAL SYSTEM.

The Philippine Educational System consists of: an elementary school curriculum, a secondary school curriculum, and several tertiary courses. The elementary curriculum comprises six years, the first four years are called the primary grades and the last two years are termed the intermediate grades. The secondary curriculum consists of four years. The tertiary or collegiate courses range from one to eight years, but typically a baccalaureate degree takes four graduates and post graduate courses. This system is shown in Figure 1.

Figure 1

PHILIPPINE EDUCATIONAL LADDER

Normal age	Level	Graduate and Postgraduate studies/programs		
24	THIRD	COLLEGES/UNIVERSITIES		
23				
22	LEVEL	General Higher Education		
21		Vocational/Technical Education		
20	(Higher or	Medicine		
19	Tertiary	Law	Sea Training	
18	Education)	Other professional Courses	(1-2 Years)	
17				
			MARITIME	Technical
			EDUCATION	Education
			(1-4 Years)	(2-3 Years)
16	SECOND	SECONDARY SCHOOLS	Vocational/Technical	
15	LEVEL		High Schools	
14	(Secondary			
13	Education)	General Secondary Education		
12	FIRST	Intermediate Schools		
11	LEVEL		Compulsary	
10	(Elementary	ELEMENTARY SCHOOLS	Education	
9	Education)			
8				
7		Primary Schools		
6				
5	PRE-EDUCATION	KINDERGARTEN AND NURSERY SCHOOLS		
4				
3				

Before a student may qualify to study in the four or five year programs leading to the baccalaureate degrees, the NCEE Law (or Presidential Decree 146) was declared. This was a helpful assessment for the reason that it limits the entry of high school graduates into these programs. Those who qualify should have passed the annual cut-off score as determined by the DECS. Admission in to the one or two year programs (e.g. BSC-Basic Seaman Course) is not subject to this requirement. The same is true for the vocational-technical programs.

This remedial measure was taken because of the great discrepancy today of educated personnel reserve and the demand for employment opportunities. In nearly all fields of educational undertaking, there is an oversupply, be it in engineering, agriculture, nursing, commerce, medicine and even maritime education. Prospective students, therefore are required to have passed the NCEE to produce competent officers.

2.4.2 VOLUNTARY ACCREDITATION FOR MARITIME INSTITUTIONS.

In 1983, an Ad Hoc Committee was created to draft an instrument of voluntary accreditation for maritime institutions. This committee was composed of staff from the Philippine Association of Maritime Institutions (PAMI) and government institutions involved in the upgrading of Maritime Education and Training to international standards and to the ideal level possible for a maritime institution to achieve, with the aid of the Funds for Assistance for Private Education (FAPE) and the Federation of Accrediting Agencies of the Philippines (FAAP).

Voluntary Accreditation of a tertiary discipline or program like the Maritime Education and Training programs, is a procedure undertaken by a Government-recognized agency to survey the facilities, management and all aspects of the educational operations of the

institution. This accreditation is done only in already recognized courses. Government accreditation, stated briefly, starts with the DECS. The maritime program, after a thorough examination and rating directed and favorably approved by the Technical Panel for Maritime Education (TPME) is granted recognition by the DECS. Recognition is unalterable and can only be canceled if the institution or its recognized programs are permitted to depreciate to sub-standard assistance from the Government, apart from the pleasure of stature and authority comparable to international institutions. The PAMI and its members have attempted to initiate voluntary accreditation in their desire to show to the world that the Maritime Education and Training given to Filipino seafarer are credible, above board and up to international standards.

The first maritime institution that has been granted the accredited autonomous recognition is the J.B. Lacson Foundation College. Other maritime institutions that are preparing to follow the voluntary accreditation process are the: University of Cebu in Cebu City; the Philippine Merchant Marine Academy in Fort Bonifacio; and the Philippine Maritime Institute Colleges in downtown Manila.

Notes and References

1. Enriched Guidelines, Policies and Standards for Maritime Education Program (EGPS). Technical Panel and Technical Committees for Maritime Education, Department of Education, Culture and Sports (DECS), Manila 1991.

CHAPTER III

THE DEVELOPMENT OF MARITIME EDUCATION AND TRAINING IN THE PHILIPPINE ARCHIPELAGO

3.1 HISTORICAL BACKGROUND

The Philippines, having more than seven thousand (7,000) islands, is considered to be an archipelago. The Philippines is composed of three main groups of islands, namely: Luzon, which is the biggest and the longest island, is situated in the northern part of the Philippines; the Visayas islands, a group of islands scattered in the central Philippines, and the Mindanao group of islands, is situated in the southern part of the Philippines. These islands are shown in the map 1. Most of these islands were inhabited long before history was recorded. The inhabitants must have originated from the neighboring land masses in Asia and the Pacific, and perhaps come to these islands by venturing the seas. Before the Spaniards came to the Philippines in 1521, the southern Filipino Muslims already sailed the Ilocos Region of northern Luzon, either to trade or, to raid the coastal villages for slaves and loot. [1] This continued even in the Spanish period so that even today, there are still remains of some stone structures that served as lookout towers along the Ilocos coasts that were constructed by the Spaniards to watch for these Muslim traders, raiders or pirates.

In some ways, the Ilocanos (natives of Ilocos province) of the northern Philippines, used sailboats called *"paraws,"* used to trade their garlic and cotton woven blankets for rice, corn and mango from the agriculturally productive Central Plain of Luzon. Cotton and garlic were already being cultivated in the Ilocos Region long before the Spaniards arrived. All along the western coast of Luzon, facing the China Sea, there are still colonies of sturdy Ilocanos who are remnants of the earlier traders who sailed the China Sea on their frail *"paraws."* Landlocked locals like the Pampangos (natives of Pampanga province)

and the Tagalogs (natives of the provinces of Bulacan, Laguna, Batangas, Quezon and Rizal) in Central Luzon, since time immemorial, have been using the Pampanga River as their outlet to the Manila Bay, navigating with their *"canoes"* to bring their crops, livestock and swine to Divisoria and other markets in Manila. The water transportation then and now is still the cheapest even in the countless islands in the southern part of the Philippines. Even people who live away from the sea or the rivers, look forward to the annual floods brought by the monsoon rains and typhoons to practice their navigation prowess on improvised rafts. Navigation and seamanship are second nature to the Filipino.

Pigafetta, the historian who accompanied Magellan, as well as the chronologers who came in succeeding mission, have recorded the evidence of ongoing trading and transmigration with the Chinese, the Indians, the Indonesians, the Malays and other tribes in mainland Asia, the Pacific Basin and the lands below the equator. The present-day Filipino is actually a polyglot of races of seafaring people. The archipelagic nature of out country required our people to seafaring.

In March 16, 1521, the Spaniards came and found the Filipinos skillful seamen and accomplished boat-builders. Upon establishment of the Manila to Acapulco trade route, the Spaniards exploited their skills to construct galleon ships making use of Philippine hardwoods from "Virgin Forests," and manning vessels with these natural seafarers who had never gone to school for formal training.

Magellan rediscovered the Philippines in March 16, 1521. Formal maritime training was introduced only during the administration of Governor General Mariano Fernandez Corqueras (1816-1822) when on April 5,1820, the Escuela Nautica de Manila (now the Philippine Merchant Marine Academy, the premier maritime academy in the country) was established. This was the first time that a maritime school has been established in Asia by the Europeans, making

the Escuela, the first maritime school in the Orient. Since Spain has many colonies during that time, another school similar to the Escuela was established in Chile in 1818.

During the Industrial revolution, steamships were introduced into the Philippines. The curriculum, then, did not change much but it revolutionized the thinking of the administrators of the Escuela Nautica de Manila. This changed, radically, the concept of maritime education in the Philippines during this period. The school was closed during the Philippine Revolution in 1896-1898.

After the Philippine-American War in 1899-1902, the Americans occupied Manila. Seeing its importance, the Escuela Nautical de Manila was reopened. On June 30, 1902, the school was renamed the Nautical School of the Phlilippine Islands and was administered by U.S. Naval Officers. Later, it was transferred to the Bureau of Higher Education and non-naval officers were appointed Superintendents of the school.

As the shipping industry was in a bad state in 1906, the authorities decided to close down the school. In the meantime, the economic development of the country was improving and so was the shipping world. This attracted Filipino businessmen to expand their business. As more ships were acquired by Filipino shipping companies towards the second decade of the American occupation, the government felt the need for trained merchant marine officers. Filipino ship owners clamored for the restoration of the Nautical School of the Philippine Islands.

The school was reopened in 1913 and was renamed the Philippine Nautical School. Before the appearance of the private maritime schools, the admission requirement of the Philippine Nautical School was completion of Second Year High School (second year of secondary education). The courses were considered vocational and the

curriculum was limited to the barest essentials in navigation and seamanship for deck officers, and steam engineering for the engine officers. The arrival of the private maritime schools elevated the admission requirement to high school graduation and the two-year maritime courses were classified as collegiate. Their diplomas were prescribed the titles of Associate in Nautical Science and Associate in Marine Engineering. Their curricula were also enriched to conform to the new advances in science and technology applied to shipping after the war.

Decades before the war, seafaring was not an attractive profession. Formal training for the profession was scoffed at and the belief then was that formal training to do jobs in navigation and seamanship on board vessels was not necessary. A short apprenticeship at the helm would suffice to steer the boat out to sea. There was no Coast Guard to accost them in port or in the open sea. The landlocked Bureau of Customs was the only government agency that supervised them. Many of the seafarers then were next to illiterate.

The Commonwealth Period was the transition period for granting the Philippines its Independence. During this period, the late President Manuel L. Quezon (1878-1944) saw the Philippine Nautical School to be a good training ground for the officers of the envisioned Off-Shore Patrol of the Philippine Army. Since the Nautical School was under the Department of Public Instruction, President Quezon issued an Executive Order transferring the Nautical School to the Department of Defense.

When the Second World War broke out, the operation of the school was suspended and many of the staffs and graduates served in the military administration. The Japanese administration took advantage of the Philippine Nautical School and offered courses in the deck and engineering fields as a part for their attraction policy. Short courses for general purpose crews were also opened.

The Philippine Nautical School reopened in 1945 and in 1950 it was transferred to the Department of Education.

3.2. THE ADVENT OF PRIVATE MARITIME SCHOOLS AFTER THE WAR.

Shortly after World War II, and even before the Philippine Nautical School was granted its charter, Capt. John B. Lacson, a retired United States Coast Guard Officer, founded the first maritime school in Iloilo City. The Iloilo Maritime Academy, definitely was a pioneering venture. This created a precedence for private enterprises to enter into the maritime education and training in the country.

A few months after the opening of the Iloilo Maritime Academy, the Naval Architecture and Marine Engineering Institute (NAMEI) was founded by the first Filipino naval architect and marine engineer.

In 1949, the Philippine Maritime Institute was founded along the Pasig River by Tomas CLoma, a lawyer-businessman. It has the highest enrollment in the Philippines today. In 1950, Captain Crispulo Onrubia, with a group of veteran merchant marine officers, established the Philippine Merchant Marine School.

In June 1961, Republic Act No. 3680 was approved converting the Philippine Nautical School into the Philippine Merchant Marine Academy (PMMA). The main objectives of which are: to provide the Philippine Merchant Marine with efficient and well-trained merchant marine officers capable of meeting the demands of an ever expanding foreign and coastwise trade; to produce competent naval officers to serve the Armed Forces in time of war or national emergency; to give adequate background to graduates for responsible positions in the various fields related to shipping such as port supervisors, marine surveyors, shipping executives; and to develop in the Filipino youth a

high moral character by inculcating the sense of responsibility, self-discipline and righteousness.

This brought the total of maritime institutions to five by the start of the 1950s, one government-owned and four privately owned. From 1820 to 1947, there was only one maritime institution, owned and operated by the government. After the last war, however, there was suddenly five.

3.3 PRIVATE SCHOOLS ENHANCES MARITIME EDUCATION STANDARD.

After the war and upon the elevation of seafaring to a respectable profession, comparable to other college graduates, the image of seafarers improved considerably. In addition, young men around with that inborn instinct for the sea, became envious of the affluence and the material comforts a seaman bring home after some years at sea.

There is a clear trend towards the employment of multi-skilled Filipino Officers and ratings. It conveys the schools should change their Maritime Education and Training Program in response to the changing demand. The strong demand for Filipino crew is reflected in the number of manning companies operating in the Philippines. There are now at least 256 of them. Of these, 110 are members of the Filipino Association of Maritime Employers (FAME) or two other associations. These organizations represent members which provide 70% of all Filipino crew. That leaves many small companies scrambling around on the margins.

The Philippines deployed 126,000 seafarers in 1991, a 13% increase on 1990 figures of 111,212. [2] This deployment earned the country US$ 640 Million of foreign exchange. This shows that Manila is still the world's ship manning capital. [3] The Philippine Overseas Employment Administration (POEA) declared that a portion of the

income generated should be invested in the training of seafarers to meet future demand. The POEA maintains a registry of 240,000 seafarers but many of these do not possess the necessary experience and qualification. The Philippines as a whole, supply approximately 22-25% of the world's seafaring labor. [4]

The image of the Filipino seafarer has improved as a result if years of cooperative efforts between the Government and the private sector in improving the program of basic education and training, and, more specifically, upgrading his skills in compliance with the International Convention on the Standards of Training, Certification and Watch keeping, 1978 (STCW 78) of the International Maritime Organization (IMO) and other international standards. The state of affairs of maritime personnel development is owed, in no small measure, to the privately owned maritime institutions. While the government-owned Philippine Merchant Marine Academy has contributed to the pool of quality graduates, due to it's limited capacity, it could not have produced over one hundred thousand seafarers registered with the POEA, of which more than half are actually on board all types of vessels all over the world and actively contribute to the economy of the country.

The employment of Filipino seafarers grew rapidly, and more maritime students were attracted. Before the end of the 1970s, a policy was declared by the Department of Education, Culture and Sports (DECS) for a moratorium on the opening of more maritime schools and colleges. However, this moratorium was lifted because of pressure from all over the country. There was a strong demand for more Filipino seafarers and the country badly needs the foreign currency that they earned. This opened the floodgates of many schools to open in the different parts of the country.

3.4 THE DIFFERENT GOVERNMENT AGENCIES INVOLVED IN MARITIME MANPOWER DEVELOPMENT.

There are five different government agencies concerned or involved in the personnel development of seafarers in the Philippines. The mutual relations of the five agencies are shown in Figure 2.

a. The Department of Education, Culture and Sports (DECS);

b. The Philippine Coast Guard (PCG);

c. The Professional Regulations Commission (PRC);

d. The Philippine Overseas Employment Administration (POEA) and the Overseas Workers Welfare Administration (OWWA); and

e. The Maritime Industry Authority (MARINA).

3.4.1 The DEPARTMENT OF EDUCATION, CULTURE and SPORTS.

The Maritime Education and Training in the Philippines is supervised by the Bureau of Higher Education. This Bureau is responsible for establishing standards and policies with the help of the Technical Panel for Maritime Education, composed of the heads of the various maritime institutions and other government agencies dealing with maritime education and training.

3.4.2 The PHILIPPINE COAST GUARD.

The Philippine Coast Guard was created pursuant to Republic Act No. 5173 as another unit of the Philippine Navy, under the supervision of the Department of National Defense, as the guardian of

sea safety and provides a total approach in its supervision over the Philippine merchant marine ships with the end in view of promoting a progressive, reliable and safe merchant fleet. In 1974, there was a revision of Republic Act No. 5173, known as the Coast Guard Law (Presidential Decree No. 601), which consolidates the fragmented functions of the Coast Guard. The PCG has one unit, the Seaman's Processing and Registration Unit (SPRU), which is responsible for the issuance of the Seaman's Service and Registration Book (SSRB) or seaman's book for seafarers, and for fishermen employed in both domestic and international trades.

3.4.3 The PROFESSIONAL REGULATIONS COMMISSION.

The Professional Regulations Commission is one of three Presidential Commissions, which was created under Presidential Decree No. 233, as amended by Presidential Decree No. 657, which has different types of professional regulatory boards, and each board composed of one Chairman and three members. Two of these regulatory boards are the Board for Deck Officers and the Board for Engine Officers. Before the deck and engine officers are allowed to practice their respective professions on board, either domestic or overseas, they are required to pass the licensure or competency examinations being administered by the commission.

Since August 1992, the International Maritime Organization's (IMO) Technical Cooperation Division has a "Technical Cooperation Project for Strengthening Certification of Seafarers in the Philippines in Accordance with the International Convention on the Standards of Training, certification and Watch keeping (STCW) 1978." The project will be jointly undertaken by the IMO, through the government of Norway (funding), with the MARINA and the PRC. It is geared towards the upliftment of training and certification quality of seafarers in the country. [5]

3.4.4 The PHILIPPINE OVERSEAS and EMPLOYMENT ADMINISTRATION and the OVERSEAS WORKERS WELFARE ADMINISTRATION.

These two administrations are attached to the Department of Labor and Employment (DOLE). The function of the POEA, is primarily to register the Filipino seafarers working on board foreign vessels and to act as agent and counselor of all the overseas Filipino workers to their national and international employers according to the International Labor Organization's (ILO) rules and regulations. On the other hand, the OWWA, is responsible for the welfare and financial disability benefits of all overseas workers. They also give free education and training for the upgrading of Filipino seafarers working on foreign vessels.

3.4.5 The MARITIME INDUSTRY AUTHORITY.

The MARINA was created on 01 June 1974 because of Presidential Decree No. 474. Originally established under the Office of the President, then later was attached to the Department of Transportation and Communications (DOTC) for policy and program coordination. It was tasked to integrate the development, promotion, and regulation of the maritime industry in the Philippines. For all practical purposes, MARINA is the duly constituted Maritime Administration in the Philippines. Likewise, MARINA is the agency that endorses Certificates of Competency under the provisions of the International Convention on Standards of Training, Certification and Watch keeping for Seafarers 1978.

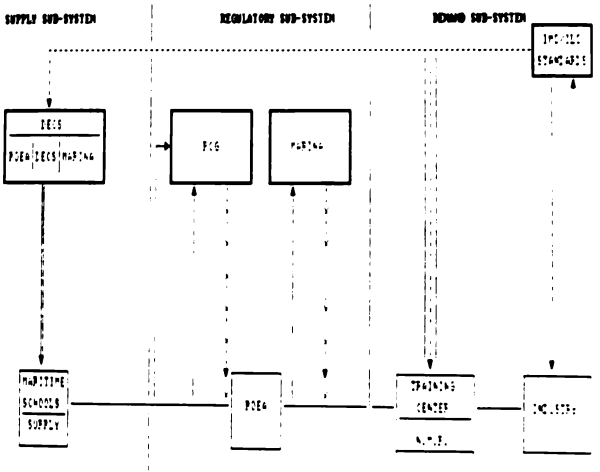
Figure 2

SEAFARERS DEVELOPMENT SYSTEM

I. SUPERVISORY MECHANISM
- DECS, MARINA, POEA

II. REGULATORY MECHANISM
- POEA (Documentation & Registration)
- MARINA & PRC (Examination & Licensing)

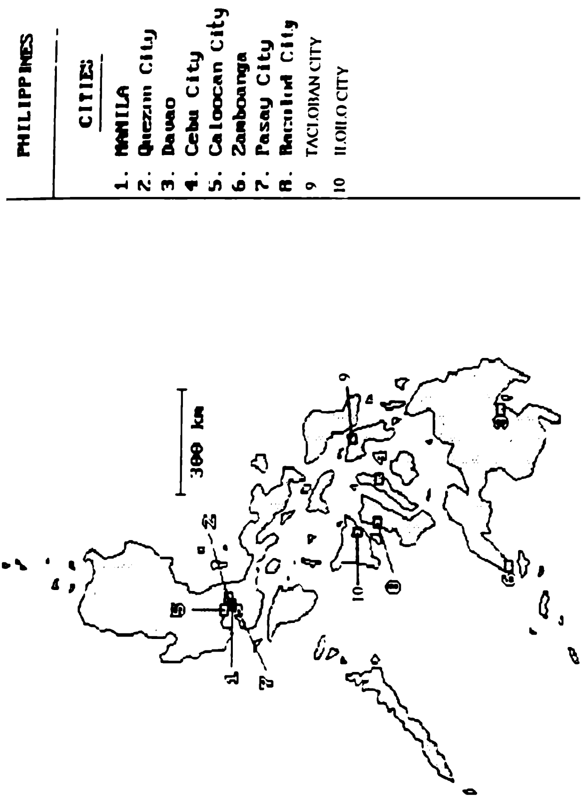
III. REFORMS & UPGRADE
- Executive Order 123-1258
- Executive Order 126



LEGEND :

- ·····→ PERFORM
- -x-x-x-→ REGULATORY
- ═══⇒ SUPERVISORY
- ——→ SUPPLY
- ·····→ UPGRADING

MARINA - Maritime Industry Authority
DECS - Department of Education, Culture & Sports
NMP - National Maritime Polytechnic
POEA - Philippine Overseas Employment Administration
PCG - Philippine Coast Guard
IMO - International Maritime Organization
ILO - International Labor Organization


PHILIPPINES
CITIES
1. MANILA
2. Quezon City
3. Davao
4. Cebu City
5. Caloocan City
6. Zamboanga
7. Pasay City
8. Bacolod City
9 TACLOBAN CITY
10 ILOILO CITY
300 km

Map 1

Notes and References

1. Baluyut, F L "The Present Situation of Maritime Education and Training in the Philippines", ESCAP Report and Proceedings on Seafarers' Training and Education. Manila, Philippines, November 1988.

2. Fairplay, Jan. 30, 1992 p. 8.

3. Fairplay -Special Report, Nov. 5, 1992 pp.54 - 56.

4. Lloyd's List, July 13, 1992 p.3.

5. Fairplay, July 09, 1992 p. 8.

CHAPTER IV

THE DEVELOPMENT IN THE MARITIME INDUSTRY AND ITS INFLUENCE IN MARITIME EDUCATION AND TRAINING

4.1 The EUROPEAN EXPERIENCE

The training of integrated officers, between the Deck Officers and the Marine Engineers, has been implemented for about twenty-five years and the long term impact has to be fully realized. France, the Netherlands, Germany and Denmark have been recognized as the pioneers in the training of integrated officers. Despite the traditional nature of the Dutch fleet, there has been an acceptance of the outlook from the early stages and the recognition of the enhanced career opportunities. The European experience shows about fifteen percent (15%) of the new intake end up as mono-role engineers and the remainder - the dual role. [1]

Future seafarers need to prepare for several changes in direction during their careers. The roles of officers and ratings need to be clearly defined.

Qualifying as a deck officer at the highest level could lead to share the post as harbor master, marine surveyor, harbor pilot, etc. or in marine insurance as shipping management.

Qualifying as an engineer officer, on the other hand, at the highest level could lead to a range of shore-based engineering posts in technology and management.

New systems of maritime education and training should be leveled at training a multi-regimen deck-engine-electronics officer. This officer should be trained to work within a role concept.

This officer would be involved in the day-to-day physical activities of running the ship at sea and in port. They would be involved in a team concept of voyage and passage planning, watch keeping routines, navigation and ship handling. The berthing and docking of the ship, the loading, the stowage, carriage and discharge of cargoes, the running of machinery and associated systems, programs of machinery maintenance, running, renewal and repair.

The training of marine engineers should include navigation, seamanship and leadership as it seems that they could provide the best inter-discipline officer of the future as they are generally better trained in technology than the deck officer. It is precisely for this purpose that this project was conceived.

4.2 PRESENT SITUATION

The officers of the 1990s clearly benefits from a better knowledge of electronics and have a good general knowledge of computers. The main emphasis will be the ability to interpret large volumes of whether data is displayed on a screen or accessed from a controlled data base. The ability to compile information into a computer format will be a distinct advantage. The product of an interdisciplinary marine officer will not stem simply from combining some parts of the old system together.

It is inferred that for a project to be successful, a more radical approach will be required. Attention must be given to behavioral science and related job functions. Task analysis will determine the training programs of the future. It should, however, be stated that the old disciplines of deck, engine and radio have served the industry very efficiently in the past. The shift should be conclusive and meaningful, supported by appropriate recruitment selection.

If the industry requires integrated or interdisciplinary officers, then the training institutions must be geared to provide them. New training programs will have to be designed to introduce relevant topics and discard the odd and redundant ones.

The maritime industry, having a rigid economy, the maritime education and training must be cost effective and at the same time maintaining the safety standards. The maritime education and training industry must learn new techniques. It must harness and welcome new methodologies and technologies of training.

The introduction of interdisciplinary officers may achieve flexibility rather than crew reduction. At peak operational demands-utilization of interdisciplinary officers are handy. Any perceived crew reductions are minimal at this time, given the limitation of automated equipment and the need to satisfy the emergency duties' rosters. There was strong support for policies that did not encourage crew reduction to a level below which ship's safety and environmental safeties are jeopardized. Cost savings may be realized due to a possible improvement in the efficiency of the ship's operation and maintenance requirements due to a better interface between the bridge control system and the engine room and machinery systems.

4.3 IMPACT OF SHIPBOARD AUTOMATION ON MARITIME EDUCATION AND TRAINING

After the end of World War II, the seascape of the maritime environment has changed significantly. Before the War, the heart of maritime movement focused in the North Atlantic area. Spearheading this field in that age were the United States of America and specifically the European countries that maintained or controlled vast areas in Africa, the Middle East and the Far East. The dominating seafaring nations mentioned counted on a network of liner services connecting those overseas assets with ports on both sides of the Atlantic and

adjoining continents, thus supplying regular assistance in transporting materials, commodities and passengers. Due to their shipping activities, several countries in Europe and America were also dominating the shipbuilding nations as well as controlling the transport of oil, raw materials and bulk agricultural products.

After the war, a majority of the colonies or dominions gained its independence, and a majority of those newly independent countries gradually entered the shipping industry by steadily building their own fleets, developing their own network of regular liner service or prospering their tonnage for the charter market.

Because of the ever increasing order for transport volume, the world- wide shipbuilding enterprise inflated and the world tonnage capacity rose from 80,000,000 gross tons in 1948 to 290,000,000 gross tons in 1973 with 30,000,000 gross tons on order for delivery in 1974.[1]

The world slump was an outcome of the oil crisis of 1973, immediately developed a worldwide over-capacity in tonnage resulting to fierce competition. To be able to maintain the viability in the shipping industry, companies had to trim down on their operating costs. Companies situated in countries with high living standards and costly social security systems were in a great disadvantage. To decrease operating costs, ship owners introduced ship's automation to reduce considerable crew size. The new situation led to a redefinition of tasks and hence a new organizational structure that affected the customary department division. This new development caused some countries (France, the Netherlands, Germany, Denmark, etc.) to amend their existing laws and regulations and to reorganize their existing maritime education and training programs to suit the changed functional conditions.

Countries with foresight, have already identified this requirement twenty years ago and have moderately changed their maritime education, training and certification systems consequently.

4.4 TRENDS IN SHIPBOARD AUTOMATION

4.4.1 GENERAL

Automation in the marine situation is not exactly defined but it is commonly understood to signify the use of control systems to replace or to support physical or rational applications in the operation and maintenance of a ship and its propulsive machinery and power supply.

Automation originated in the engine room . Main engines and boilers were controlled from remote stand. In 1958, "KINZAKAN MARU" was the first ship to be installed with an engine console in the bridge. The engine plants of very large crude carriers (VLCC) and high speed container vessels demanded accurate control procedures beyond the skills of human procedures to deter abuse to the installation under changing power demands.

The builders of steam turbine plants were in the favorable view that they could fall back on experience gained in the modern development of modern shore-based power installations where automation had been in use to regulate the effectiveness of the plant under altering power load demands. These practices were merged in the plans for marine applications. As a first hand experience of automation, there was no need to stand watch in the engine room as all control and monitoring roles could be transmitted to a control room next to the engine room. After establishing reliability, national authorities and classification societies issued certificates for continued unattended engine room operation, not only for steam plants but also for diesel plants designed for automation in the late 1960s.

At present, vessels classified as UMS (Unmanned Machinery Spaces), operates with reduced crew of 14 to 16 persons, which after sufficient experience and training is achieved, the actual workload evaluation under various service conditions justifies the need for crew reduction to reduce manning costs. This is mostly felt by shipowners residing in countries with high living standards that result in higher wages.

4.4.2 AUTOMATION APPLICATION

In contemporary control systems, micro processors, micro computers and electronics are frequently used. Datalinking between various computers based systems provide a new aspect to ship operation and management. The operation of automation fall into five main areas such as:

- Navigation;
- Propulsive Machinery and Power Supply;
- Deck and Cargo Equipment;
- Communication; and
- Administration and Management.

i) NAVIGATION

A result of progress made in automation, already universally approved, although not yet extensively practiced, is that the number of operational centers that formerly could be notable, will be reduced as far as practicable or officially approved. The definitive aim is one-manned control center (as a one-man bridge system) where all operational functions during the conduct of passage will be controlled, surveyed and monitored.

A number of ships recently joining the service have actually have the bridge equipped and laid out for centralized operational control. Subsequently all engine functions as well as communication functions are relayed to the bridge, besides navigation, collision avoidance and position fixing functions, are placed under the responsibility of the officer in charge, who for that purpose should be dual licensed or bivalent if one man bridge is aimed at.

With the bridge organized this way, it is envisioned that an officer of the watch will have no difficulties in maneuvering in restricted waters with relative high traffic density, even under poor visibility conditions.

ii) PROPULSIVE MACHINERY AND POWER PLANT

The machinery activities were the first to be automated leading to unmanned engine room operations, which with improvements in system reliability or through system redundancy could be extended to confined waters. The operations in this field are concerned with:

- Machinery Surveillance and Control;
- Performance Monitoring;
- Condition Monitoring;
- Fault Diagnosis;
- Data Logging, Processing, and Recording; and
- the Automatic Change Over to Redundancies in Case of Failure.

The progress in automation technology in this sphere will reduce the costs of maintenance and repair but will not further affect the number of people engaged.

iii) DECK AND CARGO FACILITIES

Automation is employed to establish stability and trim conditions, to control liquid cargo loading or discharge operations, a cutback of manual operation has been accomplished.

Automation has been applied in certain ship types to survey and controls the quality and the condition of the cargo and cargo environment or containment, such as for instance refrigerated cargo vessels where the cargo-installation is automated to register continuously sample values from sensors and to adjust the installation performance to keep temperature, humidity and air condition values to comply with pre-set range values. Automation has also been introduced for cargo administration and cargo stowage planning. The basis for this type of automation is:

- Improved Control;
- Safer Operation;
- Improved Registration; and
- Data Transfer of Cargo Information to Shore Organization Agencies.

iv) COMMUNICATION

The guidelines for the international distress and safety communication system have been based on fully automated communications systems for ship-internal/ship-external communications. This system, known as the Global Maritime Distress and Safety System (GMDSS), took effect February 01, 1992 and asserts that the engagement of radio officers will no longer be mandatory and control functions will be relayed to the bridge.

The advanced communication technology will be one of the most important means to change the relation between the ship organization

and the shore organizations. A fast packaged data transfer direct from ship borne terminals to shore based installations any time and practically worldwide.

v) MANAGEMENT and ADMINISTRATION

Ship computerization, which includes management and administration, will have a task-reducing impact, make lower manning levels possible and may form the basis for the direct link between ship and shore organization for integrated date transfer. Administration is one of the oldest and traditionally used types of automation in the other branches of the industry. Software packages and computer networks have been developed in the past to suit purposes such as:

Inventory control;
Accounting;
Registration;
Store keeping; and
Planning.

4.4.3 CONSEQUENCES OF SHIP AUTOMATION

Looking back at the effect of automation, it can be described that the introduction of automation has managed to:

- a restructuring of the shipboard organization;
- a change in the relation between the shipboard organization and the shore based organizations;
- a change in the distribution of tasks and responsibilities, work loads and working conditions;
- a change in manpower requirements and requirements of skill, experience and expertise;
- the adaptation of crew size and crew composition; and a change in the social sphere.

The introduction of automation in the engine room was based on the fact that the performance of the installation was very sensitive to timely corrective adjustments that could not be accomplished by manual operation. The consequence. was that a number of functions requiring labor input became obsolete resulting in a reduction in the manning scale in that department. It also changed the position of the engineers. After proven reliability of the installation, their constant presence was no longer required, their skill and expertise were still needed so they were available to fulfill other tasks within their capacity or even beyond, after supplementary training.

i) DISTRIBUTION OF TASKS and RESPONSIBILITIES

This distribution forms the foundation of the amended set-up of both the organization and the relation of the ship/shore organization, the definitive design of the ship and the specification of the installations and further equipment and devices. Each member of the crew should have a clear insight into the tasks he is employed for and the limits of his responsibilities. The organogram should clearly state his direct superior in combination to his task package.

In general, for each task, it is essential to characterize or to have an insight in the rate of skill or experience needed for safe and efficient task performance. Because technology advances rapidly, additional training and upgrading may be necessary. The wide difference in application of new devices may require the introduction on board of a medium for specific knowledge transfer pertaining to:

- the instrumentation, installations and associated procedures to operate them safely and efficiently as well as the procedures to follow in case of malfunction or failure;

- the transfer of information concerning precautions and measures to be observed related to the ship organization, to the handling of the cargo; and
- the legislation related to the specific services the ship is proposed for.

ii) CREW SIZE and CREW COMPOSITION

The crew size and composition are a derivative of the break-down of expected workload, required capacities and the work organization resulting from the company's philosophy/strategy. It is apparent [2] that the majority of the people engaged in modern ships with a fair degree of automation installed will consist mainly of persons with a relatively high level of education and training.

It is also evident [2] that with the advances made in increased reliability of automation technology and micro processor technology applicable for improved performance and condition monitoring the personnel requirement for maintenance and repair tasks will decrease. The use of maintenance-friendly materials and maintenance-free instruments also changes the personnel requirements such that the bulk of work to be performed by ratings will mainly consist of cleaning jobs and only occasionally minor maintenance and repair jobs.

iii) SOCIAL SPHERE

A total crew of twelve (12) to fifteen (15) are very small, the chance that some might become or feel isolated is unavoidable. The whole new organization is based on a structure. Everybody is expected to exactly know where he stands in the organization, in his work, in the way he has to go about his work, his responsibilities about the ship's

safety and his own or other's personal safety. Everybody should in case of a calamity situation exactly know how to react.

Crew members should be carefully selected, not only on the basis of their capabilities, skills and experiences but also on group behavior and stability.

In a group or team so small, consisting of two (2) educationally different populations, there is no place for resentment or aggressiveness. All attempts should be made to induce team spirit. Provisions should be made and measures should be taken to prevent the generation of a division into two groups.

It is assumed that if a crew configuration consists not only of two groups of people of different educational or social levels, but also stems from totally different cultural background a barrier is likely and isolation will be the consequence.

Another problem with the engagement of people of different nationalities and/or other cultural backgrounds is that because of language or culture they do not perform their tasks as expected of them and the staff lacks the time and the means to make certain that they exactly know how to cope with calamity situations.

iv) PHILOSOPHY and STRATEGY of the COMPANY

The basic philosophy of any shipowner is to provide transport service on competitive terms. To do so, he will try to seek the optimum balance between manning and the application of technology for each design concept, taking into account the type of cargo to be carried and the climatic and service area conditions as well as the specific installations required determine task's variation to be performed, their frequency of occurrence, resulting in a possible assessment of the workload to be expected and experience, knowledge and skills

required. The ship borne tasks and workload result in a certain required crew composition for safe and efficient operation.

If the shipowner has the freedom of choice where to register his fleet, he has the following options:

- to operate under a low cost flag with a mix of high cost staff and an ample complement of low cost ratings in addition to investment in simple but robust no too advanced technology;
- to operate under a low cost flag with a low cost, fairly large crew complement and investment in simple and robust technology; or
- to operate under a high cost flag with a high cost crew and investment in high-tech reliable technology.

By flagging out and engagement of a low cost crew saving in manning costs can amount to as much as US $1,000,000 per year [2] and the investment in advanced technology for labor savings can depreciate.

In all cases, the balance largely depends on the appreciation of future changes in the salary and social security costs and the depreciation of the capital investment by the ship owner.

So the philosophy or strategy of the ship owner is reflected in the design concept of the vessel and in the concept of the shipboard organization. Due to this, the shipboard organization may vary widely from ship to ship and it requires crew flexibility to fit into those various patterns.

4.5 INTEGRATION

Integration between Deck Officers and Marine Engineers can be described as an attempt to develop a more modern approach towards on board and on shore-management, combining what is technically possible with what is socially desirable and economically necessary. The approaches to an efficient organizational structure necessary for an integrated management system on board ships may best be achieved from the systems approach. In the systems approach, the ship may be viewed as a man-machine-system. A man-machine-system may be referred to when man and machine have to function together to reach a desired result.

On the account of the management on board ships, due regard should be given to the social and technical developments. Developments that have taken place within the production processes of the shore-based industries have also been apparent on board ships. These developments are:

- an increase of systematic control functions (automation) and an increasing use of mechanical means;
- a strong reduction of human muscular labor;
- an expansion of management tasks, planning and the setting of priorities;
- an advancement in the level of education of the people who participate in the production process; and
- an enlarging need of people who participate in the production processes to fulfill a recognizable and satisfactory task.

Even if crew reduction is not an original end, these developments will necessitate the integration of functions that are separated in the traditional departmental structure.

Some ideas on how to develop strategies for integration by incorporating the following:

- definition of the boundaries for the system to be treated with consideration to spatial arrangements;
- description of the structural design of the system, its functional components and the way these components are accessed;
- an analysis of the dynamic properties and process maintained by the system including its feedback links to the training environment;
- an assignment of subjects to one or more of the flow variable;
- an assignment subject as technical main functions;
- to identify individual disciplines which might contribute to the analysis;
- describe junctions between academic and skill which can be observed. Identified with definition functions to be performed along path of flow diagram;
- list guide statements for educational simplifications. We must refine the statements;
- structure the subjects by investigating the various paths of flow variables;
- prepare academic decision to simplify the flow diagram; and
- to select the teaching objectives.

Dr. P. Millar [3] further defined the sequence as follows:

Step 1. Need assessments are conducted to ascertain whether there is a need for training in a particular field.

Step 2. Perform occupational analysis. DACUM (Developing a Curriculum) innovates the gathering of occupational benchmarks, analyzing them to filter a profile of necessary task. The process draws expertise from successful practitioners. Rigorous brain storming

sessions lead to the identification of items, smaller representatives' groups are then selected and polled to validate the DACUM process.

Step 3. Performing cross correlation of skills' tasks with key academic skills for each task that is the next step. The cross matching of supporting knowledge and designation of sub-skills carries the process to a variety of increasingly complex levels. Here the planner also methodically features knowledge that can enlarge the identified tasks.

Step 4. Performing an instructional analysis to determine the teachable format that would best enable the tasks to be presented to trainees constitute this step. This involves sequencing and arranging in a fashion to enhance the interest in the training.

Step 5. Writing measurable objectives. Defining what is desired or what the trainer wants to achieve in daily content delivery features this step.

Step 6. Instructional packages are designed to facilitate delivery of the information for both the trainer and the trainee.

Step 7. Criterion refined measures are isolated to constitute a frame for evaluation of the effectiveness of the program. The process of developing a series of measurable criteria in which we can determine whether mastery of the tasks has occurred.

Step 8. Developing competency profiles assist a student in tracking individual progress as well as communicate that same progress to others.

Step 9. Field test the system and incorporate the results for further refinement.

Notes and References

1. IMLA 5th International Conference on Maritime Education and Training, Sydney, Nova Scotia, Canada, September 1988.

2. Workshop on the Integrated Training of Deck and Marine Engineer Officers. IMLA Proceedings, St. John's, New Foundland, March 1990.

3. Bjorkquist and Murphy (1987) Research, Practices and Challenges with Integrated Training. New York: Harper and Row.

CHAPTER V

RECOMMENDATIONS TO THE PRESENT MARITIME EDUCATION and TRAINING

The previous chapters describe the present status of the Maritime Education and Training and ship automation. These are important in considering the future programs of Maritime Education and Training for Filipino seafarers.

5.1 MARITIME EDUCATION and TRAINING PROGRAMS.

The Maritime Education and Training Program for both the Officers and the Ratings Upgrading Courses must be constantly redesigned to make them responsive to the changing needs of both the local and the international shipping industries. The Maritime Institutions in the Philippines should embrace some Maritime Education and Training Programs from the countries with successful Maritime Education and Training Programs.

Excellence must be pursued with vigor and with consumerate expansion of resources. Centers of excellence must be identified based on track record and internal capabilities as shown by accreditation standards approved by the Department of Education, Culture and Sports.

In the quest of distinction, motivation must be afforded in the form of greater institutional autonomy and access to more resources and other economic incentives.

5.2 FACULTY DEVELOPMENT PROGRAM.

There is still a need to come up with procedures and directives concerning the qualifications of professors and instructors. More significantly, the Department of Education, Culture and Sports should devise a strategic plan for the recruitment of professors and instructors who will form the mainstay of the school. The approach should consider incentives like competitive salary scale (the difference between a Maritime Education and Training faculty and on board earning level is several hundred percent, professional development schemes and attractive teaching and living environment. The quality of Maritime Education and Training will depend primarily on the kind of faculty the maritime institutions will be able to employ.

All maritime institutions should attempt to pursue their faculty development program according to the requirements of the DECS. Since one of the major obstacles of faculty members in pursuing post graduate degrees is financial, the Maritime Institutions should devise Educational Financial Schemes whether in the form of loans or study grants to enable faculty members to complete their study programs.

A post graduate program for licensed marine officers who are faculty members may also be established during the summer breaks. Loans or study grants may also be made available to selected faculty members to attend advance Maritime Education and Training studies abroad.

Both the academic and the professional qualifications of the faculty must be updated through a reasonable faculty development program.

Maritime Institutions with the potential to be categorized as national/zonal centers of excellence shall play a critical role in faculty

development. They should be given full support in discharging their function in faculty development.

5.3 IMPROVEMENT and UPGRADING of MARITIME INSTITUTIONAL FACILITIES.

At present, there are twenty-one (21) Maritime Institutions that have met the land area requirement based on enrollment. Majority of the schools owns the property they are inhabiting. The number of classrooms and facilities are fully utilized in most schools.

A facilities' improvement program, emphasizing the provision of laboratories equipped with Radar simulators or personal computer (PC) based simulator (Computer Aided Instruction), fire fighting equipment, electromagnetic navigation aids, and SOLAS equipment (only sixteen percent of the Maritime Institutions have their own SOLAS Laboratory Facilities).

5.4 APPRENTICESHIP/SHIPBOARD TRAINING.

The primary hindrance in the Maritime Education and Training Programs is the lack of a dynamic shipboard training program. Because of this lack of opportunity for shipboard training, many graduates fail to take the licensure examinations or certificates of competency examinations and are refused admission into the maritime service.

Excess supply from the proliferation of Maritime Institutions, which results to long competition for available apprenticeship berths which compels candidates for mandatory shipboard training to accept offers from companies without assurances that the required training will be provided. The following options are available.

5.4.1 SCHOOL-INDUSTRY LINKAGE.

The DECS should enter into an agreement with the Chamber of Maritime Industries of the Philippines (CMIP), the Conference of Interisland Shipowners' Association (CISO), and the Philippine Interisland Shipping Association (PISA) to accommodate to their vessels designated maritime graduates for shipboard training. The terms of apprenticeship should be agreed upon by the PAMI and the organization concerned.

5.4.2 SCHOOL-PHILIPPINE NAVY LINKAGE.

The PAMI and the DECS may enter into an agreement with the Philippine Navy for the apprenticeship training of selected maritime graduates aboard Philippine Navy vessels engaged in civilian operations. The terms of apprenticeship shall be subject to the requirements of the Philippine Navy.

5.4.3 EMPLOYMENT of the MV FILIPINAS TRAINING VESSEL.

The utilization of the MV FILIPINAS 1 as a training ship should be made available to selected PAMI graduates. The PAMI should enter an agreement with the National Maritime Foundation, which operates the vessel.

Regarding the required Apprentice Training Record Book, the PAMI and the DECS should revise the format that addresses the shipboard training program as required by the provisions of the IMO regarding deck and engine sea training.

The existing sea-training record books are unnecessarily theoretical instead of being task-oriented, and span a range of subject areas impossible to confront in the established shipboard duration; the

tendency is for the record books to be signed-up whether the training has taken place.

Every maritime institution should monitor very rigorously, the training of apprentice cadets and shall meet all the requirements before being given a final evaluation examination prior to clearances and release of the Transcript of Record and degree certificate.

There are thirty Maritime Institutions offering BScMT and BScME who claimed that they have an apprenticeship program and on-the-job-training for undergraduates, but they have no formal tie-up nor do they have records to show their activities.

There are only eight Maritime Institutions that have formal tie-ups for their apprenticeships. These are:

1. Philippine Merchant Marine Academy;
2. Mariner's Polytechnic Colleges Foundation-Legaspi;
3. Mariner's Polytechnic College-Naga;
4. John B. Lacson Colleges Foundation (IMA)--Iloilo;
5. John B. Lacson Colleges Foundation-Bacolod;
6. Visayan Maritime Academy;
7. Misamis Institute of Technology; and
8. Zamboanga State College of Marine Science and Technology.

These schools have an office and staff for this program of activity.

A complete overhaul and strengthening of the mandatory apprenticeship system is required.

5.5 BOARD EXAMINATION or LICENSURE EXAMINATION.

The behavior of the board examination is another major problem that confronts the graduate when he takes the marine officers licensure examinations. The difficulties encountered by the graduates have turned off many graduates and sought other professions instead. The PAMI should endeavor in dealing with this problem to protect and encourage their students. Within the present set-up with the PRC, two options are open:

5.5.1 REVIEW CENTERS

The maritime institutions should attempt to establish their own Review Centers in preparing their graduates to take the licensure examinations. These review centers must necessarily be accredited with the PRC. The energetic participation of the schools in strengthening their own graduates to take the marine examinations will not only boost their attitude but also encourage most graduates to take the examinations.

5.5.2 "WALK-IN EXAM"

The PAMI should initiate in the preparation of a position paper addressed to concerned members of the legislature to sponsor a Bill to revise the present system of the PRC in giving examinations three times a year, to a "walk in" procedure of marine examinations. In this approach, any merchant marine officer may take the examinations anytime he is on home leave. This will be a big encouragement to the marine officer, especially those serving overseas, as their home leave would be two-pronged -- for vacation and for the licensure examination.

5.6 ADMINISTRATIVE STAFF.

There are thirty-three (39) Maritime Institutions offering BScMT. Of these, twenty-two (22) have Deans who have met the minimum requirements. On the other hand, there are thirty-nine (39) Maritime Institutions offering BScME. of these, only thirteen (13) schools have Deans who have met the minimum standard requirements.

5.7 RESEARCH and DEVELOPMENT.

Research and Development are a key component in education. On the basis of a research on Maritime Schools, Research is one of the frail domain.

Research and Development should highlight on the development of prototype instruments necessary in the instruction of Marine Engineering and Nautical Studies.

Textbook writing should be encouraged.

Textbook writing grants should be made available to enable the faculty member to prepare manuscripts and textbook materials. To achieve economies of scale, books written should be assured of a market-the PAMI member institutions.

Research and Development should concentrate on developing a software package for use in Computer Aided Instruction in the Maritime Education and Training Programs.

5.8 STUDENT ENROLLMENT.

As of School Year 1991-1992, there are 25,393 2 students enrolled in the BScMT Program and 45,917 students enrolled in the BScME Program in thirty-six (36) schools throughout the country By

regional concentration, the enrollment for BScMT is distributed as follows: the National Capital Region (NCR) - 6,283 (24%); Region VI - 4,204 (16.55%); Region VII - 4,957 (19.52%) and so on (for details refer to figure 3). These three regions alone account for 60.07% of the total BScMT enrollment. Regions with least enrollment are: Region VIII - 0 and Region III (0.56%).

For the BScME Program, the distribution is as follows: NCR - 18,979 (41%); Region VI - 12,002 (26.44%); Region VII - 6,621 (14.58%) and so on. Again, these three regions account for 82.02% of the total enrollment for the BScME Program. Regions with least enrollment are :Region VII - 0 and Region VIII with 0.54%.

5.8.1 ZONAL CENTER FOR MARITIME EDUCATION.

Since enrollment is concentrated in three regions (NCR, Region VI and Region VII), zonal centers must be identified. The said zonal center shall exercise academic leadership especially with Research and Development, Faculty Development and Community services. The centers shall design programs to strengthen other institutions within the zone.

5.8.2 TOP TEN MARITIME INSTITUTIONS.

The top ten Maritime Institutions with enrollment (those that account for 74.38% of total enrollment) shall be supported through favorable Government policies and availability of resources.

To decongest the NCR, special incentives must be given to non-NCR institutions belonging to the top ten institutions. Likewise, amount the top ten schools, special privilege must be given to accredited maritime institutions as well as those which have laid out solid plans to undergo accreditation.

5.9 LABORATORY FACILITIES.

The condition of the laboratory facilities requires significant support. Assistance should be extended, especially to the top Maritime Institutions and those that are considered potential national or zonal centers of excellence.

Consortium should be advocated especially between national and zonal centers of excellence and other institutions that comprise the entire "fleet" within the zone.

Essential equipment, which are expensive should be provided, through an easy payment scheme. If they are imported, they should be exempt from taxation by the Bureau of Customs.

5.10 FINANCING.

The development programs mentioned require funding. Thus, a loan revolving fund should be made available at preferential rates of interest.

Maritime Education and Training Programs are truly costly. Thus, full costs should be charged by both the State and the Private Maritime Institutions. Those who cannot afford to pay the full costs of instruction shall be granted scholarships.

Tuition fee practice for Maritime Institutions should be estimated with the instruction costs, taking into account the special nature of the laboratory equipment, computer software, apprenticeship on board vessels, and other peculiarities of the Maritime Education and Training Programs.

5.11 LIBRARY.

Availability of professional textbooks is pitifully wanting. Special attention should be given to the procurement of professional books and periodicals.

Incentives for Maritime Institutions to achieve the desirable level of book-student ratio should be provided in such forms as centralized purchasing scheme with subsidy from the Government and the Maritime Industry.

At present, the mean ratio of books per student is two whereas the minimum requirement is five. [3]

5.12 COMPLIANCE with the DEPARTMENT of EDUCATION, CULTURE and SPORTS REQUIREMENTS.

The DECS should define an acceptable rating for Maritime Institutions to continue to operate. Maritime Institutions rating below an acceptable level shall be given a period to reach a level of acceptance. Non-compliance within the specified period shall mean eventual phase-out of the Maritime Education and Training Program or conversion of its Program to a more suitable alternative.

5.13 EXAMINATIONS and PLACEMENT of GRADUATES.

Professionalism in test admission should be attempted with vigor. High achieving schools with percentage of passing in professional examinations should be given public commendation and other incentives to enable them to uphold reliable performance rating.

A study should be made to identify factors that justify for good performance in licensure examinations. Findings of such study shall be the basis for enhancing assistance and support to high-achieving

Figure 3.1
Enrollment and Graduates
By Region / School and Courses
School Year 1990-1991 and School Year 1991-1992

REGION / SCHOOL	ENROLLMENT STATISTICS 1991 - 1992		GRADUATE STATISTICS 1990 - 1991	
	MT	Mar E	MT	Mar E
NATIONAL CAPITAL REGION				
PHILIPPINE MERCHANT MARINE ACADEMY	524	360	109	101
FEATI UNIVERSITY	663	540	83	172
TECHNOLOGICAL INSTITUTE OF THE PHILIPPINES - Quezon City		2,451		293
TECHNOLOGICAL INSTITUTE OF THE PHILIPPINES - Manila		4,933		394
PHILIPPINE MARITIME INSTITUTE	5,096	10,675	59	448
REGION III				
BATTAN HEROES MEMORIAL COLLEGE	143	327	19	69
CENTRAL LUZON INSTITUTE OF TECHNOLOGY		647		133
REGION IV				
LYCEUM OF BATANGAS	1,563	717	152	212
PALAWAN POLYTECHNIC COLLEGE	83	260	11	63

Figure 3.2
Enrollment and Graduates
By Region / School and Courses
School Year 1990-1991 and School Year 1991-1992

REGION / SCHOOL	ENROLLMENT STATISTICS 1991 - 1992		GRADUATE STATISTICS 1990 - 1991	
	MT	Mar E	MT	Mar E
REGION VI				
ILOILO STATE COLLEGE OF FISHERIES	121		10	
JOHN B. LACSON COLLEGES FOUNDATION - ILOILO CITY	2,035	3,153	299	599
JOHN B. LACSON COLLEGES FOUNDATION - BACOLOD CITY	735	1,505	86	263
VISAYAN MARITIME COLLEGE	820	1,366	56	330
R T C COLLEGE	483	654	45	186
NORTHERN ILOILO POLYTECHNIC STATE COLLEGE - ESTANCIA		358		119
SOUTHERN ILOILO POLYTECHNIC STATE COLLEGE - MIAG-AO		279		
WEST VISAYAS COLLEGE OF SCIENCE AND TECHNOLOGY		465		172
WESTERN INSTITUTE OF TECHNOLOGY		2,648		542
UNIVERSITY OF ILOILO		1,506		146

Figure 3.3
Enrollment and Graduates
By Region / School and Courses
School Year 1990 - 1991 and School Year 1991-1992

REGION / SCHOOL	ENROLLMENT STATISTICS 1991 - 1992		GRADUATE STATISTICS 1990 - 1991	
	MT	Mar E	MT	Mar E
REGION VII				
CONCORD TECHNICAL INSTITUTE	50			
UNIVERSITY OF CEBU	2,937	3,723	293	715
UNIVERSITY OF TEH VISAYAS	1,970	2,531	130	503
CEBU STATE COLLEGE OF SCIENCE AND TECHNOLOGY - Cebu City		220		72
CEBU STATE COLLEGE OF SCIENCE AND TECHNOLOGY - Danao		145		38
REGION VIII				
LEYTE INSTITUTE OF TECHNOLOGY		245		81
REGION IX				
ZAMBOANGA SCHOOL OF ARRTS AND TRADES		465		180
ZAMBOANGA STATE COLLEGE OF MARINE SCIENCE AND TECHNOLOGY	699	132	66	

Figure 3.4
Enrollment and Graduates
By Region / School and Courses
School Year 1990 - 1991 and School Year 1991 - 1992

REGION / SCHOOL	ENROLLMENT STATISTICS 1991 - 1992		GRADUATE STATISTICS 1990 - 1991	
	MT	Mar E	MT	Mar E
REGION X				
SOUTHERN DE ORO PHILIPPINES COLLEGE	184		27	
SAINT JOSEPH INSTITUTE OF TECHNOLOGY	253	763	19	16
CAGAYAN CAPITOL COLLEGE	936	903	63	115
MISAMIS INSTITUTE OF TECHNOLOGY	1,981	691	190	128
REGION XI				
MINDANAO POLYTECHNIC COLLEGE	552	656	31	131
MATS COLLEGE OF TECHNOLOGY	1,460	1,139	210	124
AGRO-INDUSTRIAL COLLEGE FOUNDATION	871	452	122	102
REGION XII				
ILIGAN CAPITOL COLLEGE	318		60	
TOTAL	**25,393**	**45,395**	**2,189**	**6,654**

Notes and References

1. Baluyut, F L "The Present Situation of Maritime Education and Training in the Philippines," ESCAP Report and Proceedings on Seafarers' Training and Education, Manila, Philippines, November 1988 pp. 166-167.

2. DECS-PAMI Survey 1992.

3. Enriched Guidelines, Policies and Standards for Maritime Education Program (EGPS). Technical Panel and Technical Committees for Maritime Education, Department of Education, Culture and Sports, Manila, Philippines, 1991.

CHAPTER VI

IMPLEMENTATION OF THE RECOMMENDATIONS

6.1 ESTABLISHMENT OF REGIONAL/ZONAL CENTERS OF EDUCATION and TRAINING

The need for the establishment of regional/zonal centers of Maritime Education and Training is felt due to the present Maritime Education and Training System that is restricted and with limited resources and facilities. To maintain the quality of Maritime Education and Training and to trim down the number of enrollees in the Maritime Education Programs, regional/zonal centers are to be established.

The regional/zonal centers are Maritime Institutions equipped with modern facilities, simulators, and competent faculty members and are strategically located throughout the Philippines with the aim of re-educating the seafarers who have rendered sea service. These regional centers are to be situated in the following areas:

1. The PHILIPPINE MERCHANT MARINE ACADEMY in Metropolitan Manila;
2. The JOHN B. LACSON COLLEGES FOUNDATION in Iloilo City;
3. The UNIVERSITY OF CEBU in Cebu City; and
4. The NATIONAL MARITIME POLYTECHNIC in Tacloban City.

6.1.1 PURPOSE

The purpose of such Maritime Education and Training is to teach the experienced seafarers the necessary skills for the safe and efficient operation of vessels.

The regional/zonal centers are designed to continually upgrade the Officers and Ratings to further enhance their competency and proficiency. With the advancement in shipboard automation, crew reduction requires the performance of interdisciplinary tasks and skills' flexibility of the seafarer. Retraining would help seafarer to familiarize themselves with the new developments.

As shown in Figure 4, the regional/zonal centers make it possible for the Ratings to become Officers. In other words, a Rating has the possibility of taking in the future, the job of a Master or a Chief Engineer, once he obtains the proper certificate. This may also stimulate the enthusiasm fro studying among Ratings and consequently cause them to increase their will to work.

6.1.2 COURSES

To be established are: an Advanced Course, a Special Training Course, a Short Training Course and a Correspondence Course. Admission requirements vary for each of the different courses.

Fittingly, the number of students, the period and the subject of the courses and the qualifications after graduation varies, conforming to the objectives of the respective courses.

1. The ADVANCED COURSE should be designed to give Marine Officers who possess a license higher than the Third Officer, for the Deck Department, and the Fourth Engineer, for the Engine Department, the necessary education for obtaining higher Certificates of Competency and deeper knowledge on the ship's operation and maintenance. (Refer to Table 5.1)

2. The SPECIAL TRAINING COURSE should be designed to give the necessary education according to the license qualifications prescribed by the International Convention on Standards of Training,

Certification and Watchkeeping for Seafarers 1978 (STCW 1978). (Refer to Table 5.2A and 5.2B)

3. The SHORT TRAINING COURSE should be designed to conduct short-term education for seafarers on the ship's technical aspects. which is at times demanded by the administrative and enforcing authorities. (Refer to Table 5.3A and 5.3B)

4. The CORRESPONDENCE COURSE should be designed to provide seafarers with education by correspondence for the purpose of deepening their knowledge on ship's operation and/or giving preparatory study for higher maritime officer's competency. (Refer to Table 5.4)

Some of these courses offer Marine Officers the types of Maritime Education and Training they have not previously received for the purpose of contributing to the modernization of the Maritime Education and Training. The courses which train Watch Officers include the Watch Officers Courses in the Officers and Ratings classes of the short training section. The Officers class provides holders of Certificates of Competency higher than Third Officer or Fourth Marine Engineer with education on Navigation or Engineering so that they may qualify for the Third Officer or Fourth Marine Engineer for Watch, thereby supporting their licenses and Watchkeeping Certificates.

On the other hand, the Watchkeeper class provides Deck Ratings or Engine Ratings, with sea service of three years or more, with knowledge on Navigation or Engineering for the Watchkeeper's Certificate.

The proposed syllabus of the Regional/Zonal Center is shown in the succeeding pages, and the courses related to the upgrading mentioned above are also illustrated.

TABLE 5.1

PROPOSED CURRICULA OF THE ADVANCED COURSE

SUBJECTS	NAVIGATION HOURS	ENGINEERING HOURS
Navigation	280 (240)	
Seamanship	380 (100)	
Fundamentals of Navigation		(40)
Engineering 1		240 (60)
Engineering 2		400 (140)
Engineering 3		400 (180)
Fundamentals of Engineering	120 (40)	
Laws	240 (40)	80 (40)
Economics and Shipping	40 (140)	(140)
Ethics	60 (20)	60 (20)
Mathematics	240 (120)	240 (120)
Physics and Chemistry	220 (100)	260 (100)
Academic Study	(120)	(120)
Required Hours for Graduation	2,500	2.500

Remarks: ( ) shows the maximum number of hours of the elective subjects

Engineering 1 Boiler, Turbine, Internal Combustion Engine, etc.

Engineering 2 Auxiliary Machineries, Electricity, Electronics, Automatic Controlling, etc.

Engineering 3 Fuel and Lubrication, Applied Dynamics of Machines, Engineering Drawing, etc.

TABLE 5.2A

SPECIAL TRAINING SECTION
(1) NAVIGATION CLASS

SUBJECTS	CHIEF OFFICER	SECOND OFFICER	THIRD OFFICER
NAVIGATION	235	255	490
SEAMANSHIP	260	280	430
FUNDAMENTALS OF ENGINEERING	20	20	60
LAWS	100	80	140
ECONOMICS and SHIPPING	45	45	
ETHICS	20		20
MATHEMATICS			80
PHYSICS and CHEMISTRY			80
ACADEMIC STUDY	50	50	
TOTAL	730	730	1,300

TABLE 5.2 B

(2) ENGINEERING CLASS

SUBJECTS	SECOND ENGINEER	THIRD ENGINEER	FOURTH ENGINEER
FUNDAMENTALS of NAVIGATION	20	20	20
ENGINEERING 1	200	200	300
ENGINEERING 2	220	220	335
ENGINEERING 3	180	180	285
GENERAL MANAGEMENT in ENGINEERING	60	60	180
ETHICS			20
MATHEMATICS			80
PHYSICS nad CHEMISTRY			80
ACADEMIC STUDY	50	50	
TOTAL	730	730	1300

TABLE 5.3 A
SHORT TRAINING COURSES

NAVIGATION WATCH CLASS

SUBJECTS	HOURS
TERRESTRIAL NAVIGATION	95
CELESTIAL NAVIGATION	60
NAVIGATIONAL AIDS and INSTRUMENTS	75
EXPERIMENTS and PRACTICE	15
NAVAL ARCHITECTURE	15
SHIP MAINTENANCE	45
MARINE CARGO OPERATIONS	65
WATCHKEEPING	15
SHIP HANDLING	30
MARINE CASUALTIES	15
MARITIME METEOROLOGY	30
SHIP COMMUNICATION	15
MARINE SANITATION	15
RULES OF THE ROAD	60
MARITIME LAWS	10
MARITIME ENGLISH	35
RADAR OBSERVATION	20
RADAR SIMULATOR	14
LIFE SAVING	14
FIRE FIGHTING	7
TOTAL	651

TABLE 5.3 B
ENGINEERING WATCH CLASS

SUBJECTS	HOURS
BOILER	45
STEAM TURBINE	45
INTERNAL COMBUSTION ENGINE and GAS TURBINE	95
SHIP PROPULSION and NAVAL ARCHITECTURE	45
AUXILIARY MACHINERY	60
ELECTRICITY	50
ELECTRONICS	30
AUTOMATIC CONTROL	60
MARINE INSTRUMENTATION	30
FUEL and LUBRICATION	30
GENERAL ENGINEERING MANAGEMENT	40
MARITIME RULES and REGULATIONS	30
MARITIME ENGLISH	35
LIFE SAVING	10
FIRE FIGHTING	10
TOTAL	610

TABLE 5.4
CORRESPONDENCE COURSES

NAVIGATION

SUBJECT

SCIENCE
MATHEMATICS
MARITIME ENGLISH
NAVIGATION/NAVIGATION AIDS
SEMANSHIP
CARGO HANDLING/LOGISTICS
MARINE CASUALTIES
SHIPPING/MARITIME LABOR
MARITIME LAWS

ENGINEERING

SUBJECT

SCIENCE
MATHEMATICS
MARITIME ENGLISH
MARINE PROPULSION ENGINES
MARINE AUXILIARY ENGINES
ELECTRICITY/ELECTRONICS
AUTOMATIC CONTROL/INSTRUMENTATION
FUNDAMENTALS OF ENGINEERING
SHIPPING/MARITIME LABOR

6.2 THE NEED FOR INTRODUCING A BACHELOR OF SCIENCE IN NAUTICAL STUDIES with TECHNICAL OPTIONS PROGRAM (B.Sc.N.S.T.O.).

Having the seen the trend of crew reduction due to ships' automation, it is proposed that a new Maritime Education and Training Program be introduced in the Philippines.

Entrance Requirements for Students of the B.Sc.N.S.T.O Program

1. The prerequisite for admission into the program is that the candidate should have passed the National College Entrance Examination (NCEE).

2. The candidate must be a Filipino citizen with good moral character as certified by pertinent authorities.

3. The candidate must meet the physical and medical requirement especially hearing and eyesight.

4. The candidate must be a member of the upper twenty percent (20%) of the class in high school.

5. The candidate must obtain an NCEE mark of at least seventy-five percent (75%) in both Mathematics and English and an overall average of at least eighty-three percent (83%).

6. The candidate will also be submitted to take Intelligence Quotient (IQ) examinations to secure the students with the highest potential.

After a candidate has been eligible for the above-mentioned criterion, twenty (20) candidates with the highest marks would be

admitted. Twenty candidates for the initial phase of this program is ideal so that it would be easy to monitor the progress of the students and more personal interaction would be encouraged. As the program is essentially a combination of the traditional Marine Transportation and Marine Engineering Programs, the students must be mathematically inclined.

It is essential that this Program be also implemented in the Regional/Zonal Centers as they have the necessary equipment and facilities.

As simulators are expensive, the Regional/Zonal Centers should start upgrading their facilities by introducing Computer Aided Instruction (CAI), as more personal computer software packages, regarding Maritime Education and Training, are readily available in the market.

The outcome of this Program would not be realized until after four or five years. The initial investment would not easily be recovered. Likewise, should the program prove to be successful and demand is high, the Maritime Institutions should start upgrading their facilities, equipment and faculty to be able to offer this Program.

The proposed curriculum of the said program is shown in the succeeding pages.

FIRST YEAR

First Semester

Subject Code	Course Description
Engl 1	Communication Arts & Skills
Math 1	Algebra & Plane Trigonometry
Pil 1	Sining ng Pakikipagtalastasan
Chem 1	General Chemistry 1
Ethics 1	Introduction to Shipboard Practice & Professional Ethics
Seam 1	Ship Nomenclature & Practical Seamanship
SOLAS 1	Personal Survival Techniques & First Aid
P.E. 1	Physical Education 1
NROTC 11	Naval Reserve Officers Training Course 11

Second Semester

Subject Code	Course Description
Engl 2	Maritime Communications
Math 2	Solid Mensuration & Spherical Trigonometry
Phys I	Engineering Physics 1
SOLAS 2	Survival Craft & Fire Fighting
Nav 1	Elements & Principles of Navigation
Drwg 1	Engineering Drawing 1
Met	Meteorology/Oceanography
Mar E 1	Ship Construction & Machinery & Basic Naval Architecture
P.E. 2	Physical Education 2
NROTC 12	Naval Reserve Officers Training Course 12

SECOND YEAR

First Semester

Subject Code	Course Description
Engl 3	Business English Correspondence & Technical Report Writing
Phys 2	Engineering Physics 2
Math 3	Differential & Integral Calculus
Drwg 2	Engineering Drawing 2
Mar E 2	Machine Shop Practice 1
Mar E 3	Marine Refrigeration & Air Conditioning
P.E. 3	Physical Education 3
NROTC 21	Naval Reserve Officers Training Course 21

Second Semester

Subject Code	Course Description
Electro 1	Basic Electronics
ENS	Electronic Navigation Systems
Mar E 4	Machine Shop Practice 2
Mar E 5	Steam Engineering
Thermo 1	Thermodynamics/Internal Combustion Engines
Mar E 6	Engineering Materials & Testing
TEA	Transportation Economics and Accounting
P.E. 4	Physical Education 4
NROTC 22	Naval Reserve Officers Training Course 22

THIRD YEAR

First Semester

Subject Code	Course Description
Pil 2	Panitikang Pilipino
Seam 2	Cargo Handling & Stowage
ML 1	Maritime Law
Soc Sci 1	Phil. Gov't. & The New Constitution
Soc SCI 2	Taxation & Land Reform with Family Planning
EE	Elementary Electrical Engineering
Comp	Computer Fundamentals & Programming
SM	Ship Operation and Management

Second Semester

Subject Code	Course Description
Mar E 7	Fuel Oil & Lubricants
Mar E 8	Marine Electronics/Automation
ML 2	Collision Regulations
Soc Sci 3	Life & Works of Rizal
Soc Sci 4	General Psychology & Behavioral Sciences
Mech	Engineering Mechanics
Nav 2	Terrestrial & Celestial Navigation
SH	Ship Handling & Maneuvering
SB	Shipping Business

FOURTH YEAR

One Year Apprenticeship or Shipboard Training .

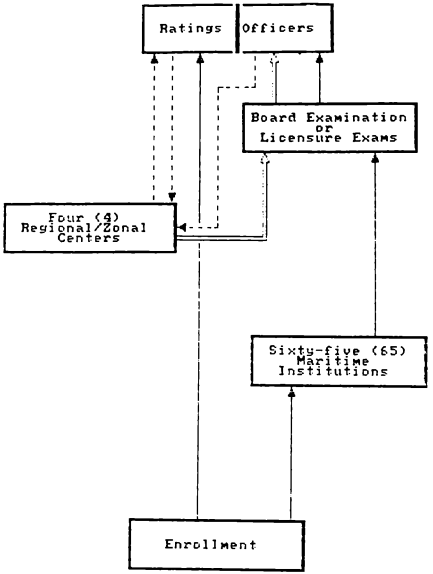


FIGURE 4 – SYSTEM SET-UP

LEGEND:

- ⟶ Seafarers Education
- ⟹ Examination for Officers' License
- ----▸ Seafarers Retraining

BIBLIOGRAPHY

IMLA 5th International Conference on Maritime Education and Training, Sydney, Nova Scotia, Canada, September, 1988.

Kogan, M (1979) Educational Policies in Perspectives: An Appraisal of OECD Country Educational Policy Reviews, Paris:OECD.

Mathews, J (1989) Curriculum Exposed London: David Fulton Publishers.

Moore, M and Ozga J (1991) Curriculum Policy Great Britain: Pergamon Press.

Proceedings of Seminar on Seafarers' Training and Certification, ESCAP, Tokyo, Japan, October 1983.

Report and Proceedings of the Seminar on Seafarers Training and Education, ESCAP, Manila, Philippines, November 1987.

Rowntree, D (1981) Developing Courses for Students, United Kingdom:McGraw-Hill.

Workshop on the Integrated Training of Deck and Marine Engineer Officers, IMLA, St. Johns, New Foundland, Canada, March 1990.

Various Lectures on Maritime Education and Training by P. Muirhead, World Maritime University, Malmö, Sweden