A CRITICAL ANALYSIS OF THE CHARACTERISTICS OF AND PROBLEMS EXPERIENCED BY THE STUDENTS IN THE ELECTRONIC NAVIGATION SYSTEMS (FISHERMAN) COURSE AND THE IMPLICATIONS FOR FUTURE STUDY

BY

EDWARD DALE SNYDERS

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SUPERVISOR: DR P J LE ROUX

CO-SUPERVISOR: MR L J CLEOPHAS

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DECLARATION

"I, the undersigned, hereby declare that

A CRITICAL ANALYSIS OF THE CHARACTERISTICS OF AND PROBLEMS EXPERIENCED BY THE STUDENTS IN THE ELECTRONIC NAVIGATION SYSTEMS (FISHERMAN) COURSE AND THE IMPLICATIONS FOR FUTURE STUDY

is my own work. All sources used or quoted have been fully indicated and acknowledged by means of complete references."

E D SNYDERS

DATE: 16 OCTOBER 1992

ABSTRACT

Electronic navigation systems (ENS) have undergone phenomenal growth and development since the Second World War and there is every indication that it will continue to do so for as long as the threat of war prevails.

A positive effect in this rapidly developing science, has been its application commercially, especially in aeronautical systems.

To the ENS (Fisherman) course students of the Training Centre for Seamen (TCS), a technical college based in Cape Town, the advent of these modern navigation aids (navaids) made a marked impact on their, previously, simple existence and certain problems with regard to their training became evident.

An empirical study, by means of a questionnaire, was thus undertaken in order to identify and possibly solve problems experienced by these students during both the sea-going and college-based phases. Specific areas investigated included,

* academic, vocational and socio-economic background
* language competency
* lack of on-board exposure to instrumentation within junior ranks and

* large age differences as well as differing levels of experience and competency in the same class group.

In a bid to seek possible solutions, a comparative study was made of similar courses offered by institutions both locally, viz. the Cape Technikon and the South African Navy and abroad, viz. Australia, Denmark, Germany, United Kingdom and United States of America.

Structured interviews were also held with ENS (Fisherman) course lecturers, representatives of shipowners and the South African Department of Transport officials to test their opinions with regard to the existing ENS training structures and the associated problems identified.

Based on the information obtained in this study, conclusions and recommendations on the following have been made, viz.

* Formulation of a new maritime training dispensation for South Africa
* In-house training facilities
* Academic background of students
* Living and working conditions on-board
* Heterogenous composition of ENS (Fisherman) class
* Amalgamation of existing ENS training resources
* On-board training programmes
* Formal teaching qualifications

* Marketing careers at sea and

* Research in maritime education and training

ABSTRAK

Elektroniese navigasiestelsels (ENS) het merkwaardige vooruitgang en ontwikkeling getoon sedert die Tweede wêreldoorlog en alles dui daarop dat dit so sal voortduur solank die gevaar van oorlog heers.

'n Positiewe effek van hierdie snelontwikkelende wetenskap is die aanwending in die handel, veral lug- en seevaartstelsels.

Vir die studente wat die ENS (Visserman)- kursus deurloop aan die Opleidingsentrum vir Seelui (OSS), 'n tegniese kollege gebaseer in Kaapstad, het die intrede van hierdie moderne navigasiehulpmiddels 'n opvallende uitwerking op hul eens, eenvoudige lewensbestaan gehad en sekere probleme ten opsigte van hul opleiding het voor die hand liggend geword.

'n Empiriese ondersoek met behulp van 'n vraelys aan hierdie studente is onderneem om probleme wat hulle ervaar het gedurende die kollege en seevarendefases, sowel as moontlike oplossings, te identifiseer. Spesifieke areas van ondersoek het die volgende ingesluit:

* akademiese, beroeps- en sosiaal-ekonomiese agtergrond

* taalbevoegdheid
* die gebrek aan blootstelling onder junior geledere aan elektroniese navigasietoestelle en
* groot ouderdomsverskille, sowel as uiteenlopende vlakke van ervaring en bekwaamheid in dieselfde klasgroep.

Hierbenewens is 'n vergelykende studie van dergelike kursusse in Suid-Afrika (Kaapse Technikon en Suid-Afrikaanse Vloot) sowel as in die buiteland (Australië, Denemarke, Duitsland, Verenigde Koningkryk en Verenigde State van Amerika) onderneem om moontlike oplossings te bereik.

Onderhoude is gevoer met die dosente van die ENS (Visserman)- kursus asook verteenwoordiges van skeepseienaars en die Departement van Vervoer se amptenare, om hul menings in verband met die bestaande ENS opleidingstrukture en die probleme daaraan verbonde te toets.

Gegrond op die inligting verkry in hierdie studie, is gevolgtrekkinge en aanbevelings ten opsigte van op die volgende gemaak:

* Formulering van 'n nuwe bedeling vir maritieme opleiding in Suid-Afrika
* In-huis opleidingsfasiliteite
* Akademiese agtergrond van studente

* Lewens- en werksomstandighede aan boord
* Heterogene samestelling van die ENS (Visserman)-klas
* Samesmelting van bestaande ENS opleidingsinstansies
* Opleidingsprogramme aan boord
* Formele onderwyskwalifikasies
* Bemarking van loopbane op see en
* Navorsing in maritieme opvoeding en opleiding.

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DEDICATION

The following messages are dedicated to those mariners who bravely ply our mighty oceans in order to make ends meet.

> "I will lift up mine eyes unto the hills, from whence cometh my help. My help cometh from the Lord, which made heaven and earth."
> (Psalm 121:1-2)

> "And he began again to teach by the sea side: and there was gathered unto him a great multitude, so that he entered into a ship, and sat in the sea; and the whole multitude was by the sea on the land."
> (St Mark 4:1)

CHAPTER ONE: INTRODUCTION, STATEMENT OF THE PROBLEM, PURPOSE OF THE STUDY AND METHOD OF INVESTIGATION

CHAPTER TWO: THE HISTORY AND DEVELOPMENT OF MARINE NAVIGATION AND THE TRAINING CENTRE FOR SEAMEN

CHAPTER ONE: INTRODUCTION, STATEMENT OF THE PROBLEM, PURPOSE OF THE STUDY AND METHOD OF INVESTIGATION

CHAPTER ONE

LIST OF ABBREVIATIONS

AMC	Australia Maritime College
CNN	Cable News Network
Codesa	Convention for a Democratic South Africa
DMA	Danish Maritime Authority
ENS	Electronic Navigation Systems
IMO	International Maritime Organisation
FAO	Food and Agricultural Organisation
GPS	Global Positioning System, also referred to as Navstar
MSA	Merchant Shipping Act, Act 57 of 1951, as amended
Navaids	Navigational aids
Navstar	Navigation system with Time and Ranging (refer GPS)
Radar	Radio Detection and Ranging
RDF	Radio Direction Finder
RSA	Republic of South Africa
SADOT	South African Department of Transport, Shipping Directorate, Marine division
Safmarine	South African Marine Corporation Limited
SAN	South African Navy

Satnav	Satellite navigator/navigation
SDI	Strategic Defense (sic) Initiative
STCW	Standards of Training, Certification and Watchkeeping for Seafarers, 1978.
TCS	Training Centre for Seamen
UK	United Kingdom
UN	United Nations (Organisation)
US	United States
USA	United States of America

CHAPTER ONE

INTRODUCTION, STATEMENT OF THE PROBLEM, PURPOSE OF THE STUDY AND METHOD OF INVESTIGATION

1.1 INTRODUCTION

Within the technological field, the world is currently experiencing a knowledge explosion and rapid technological advances in computerisation, simulation, robotics, fibre-optics, semi-conductors and laser technology, to mention a few, bear witness to this quantum leap.

According to Sonnenberg (1978:1)

> "the growth of electronic navigation systems during the past thirty years has been dramatic. Few scientific or industrial developments have ever before expanded so rapidly, or found vital application so quickly and on such a large scale. Electronic aids to navigation such as radio direction finders, Decca navigators, Loran and Satellite navigators have already proved of inestimable value in peace as in war and are still advancing in scope and reliability."

An example would be the recent development of the Navigation System with Time and Ranging - Global Positioning System (Navstar - GPS) which plays a vital role in the missile guidance system of former United States of America (USA) president Reagan's renowned Strategic Defence Initiatitive (SDI) or commonly referred to as the Starwars project.

The surgical precision with which targets were demolished by allied forces during Operation Desert Storm (Iraq - Kuwait conflict commencing 16 January 1991), demonstrates the awesome power, albeit destructive, of this type of rapidly advancing modern technology.

For the first time in the documented history of mankind, conflict of this nature was witnessed live by millions of television viewers worldwide, in the luxury of their homes (courtesy Cable News Network - CNN) in the Republic of South Africa (RSA). This feat is, oncemore, evidence of the seemingly endless capabilities of technology.

Our local fishing industry is making extensive use of electronic navigation systems (ENS). Equipment such as Decca navigators, echo sounders, radio detection and ranging (radar) systems and radio direction finders (RDF) are fitted aboard their highly sophisticated, modern trawlers and fishing vessels.

In the not too distant past, when catches were plentiful, fishermen had no need to venture far from the coast in order to make a living or feed their families. Ships were smaller, trips shorter and economic pressures such as inflation and high interest rates not that great.

These men of steel in their wooden craft relied almost entirely on their local knowledge of the coastline. They memorised certain coastal features and salient points of land to safely navigate their vessels into the sheltered waters of the harbour.

As fishermen are exposed to rough, treacherous seas and rudimentary living quarters, people with faint hearts seldom pursue a career at sea. The work is strenuous and the hours long. A voyage could last from a few days to a month, depending on the availability of fish.

Subsequently, many facets in the life of the fisherman has changed, viz.

* Fish are becoming a scarcity, with the result that they have to venture further from the coast in order for them to fill their holds.
* This led to various legislation coming about in the form of the present quota system, to protect the marine resources from being eradicated.

* As these men were now forced to venture out of sight of the land, they relied more heavily on electronic navigation aids (navaids) to assist in orientating themselves and returning to port.
* In order to operate these navaids efficiently meant that these men had to undergo formal training to gain competence.
* The demand to satisfy the local and international export food markets led to the advent of fishing conglomerates with sufficient financial muscle to dominate these markets.
* This led to bigger, faster, more sophisticated vessels which required professional manning skills.

The life of the fisherman was to be changed forever by rapid advances in technology, as well as changing socio-political and economic factors. The old adage, viz. ships of wood and men of steel, was rapidly being transformed into ships of steel and men of wood. The call of the sea infiltrated through to a larger target population, namely, people with secondary schooling who were more suited to the new challenges.

Unemployment, ironically, prompted many a matriculant to attempt a career within the fishing industry. These candidates were well suited to meet the demands this new dynamic industry and international requirements, viz. the

International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, regarding the manning of ships presented (Referred to locally and internationally as the STCW Convention).

The STCW convention was, in terms of Government Notice Number R.71 of 1984, added as the Fifth Schedule to the Merchant Shipping Act (MSA) of 1951 (Act 57 of 1951), as amended. It came into force in the RSA on 28 April 1984.

The question of competence in the use of these modern electronic navaids now comes to the fore. Improved catches are to a large extent dependent on how efficiently these electronic navaids are utilized.

It is imperative that the navigator is proficient in the correct setting up and operational procedures, as well as being aware of the limitations of each instrument. The correct interpretation of acquired data not only yields better catches, but ultimately assures the safety of the vessel and her crew.

The Minister of Transport Affairs, under section 358(1) of the MSA of 1951 (Act 57 of 1951), as amended, tabled certain regulations in Government Gazette Number 10026, viz. Regulation R.2653, called the Examination Regulations for Certificates of Competency as Fisherman and

Marine Motorman, 1985 as amended.

This document required all potential candidates wishing to attempt the examination for the Fisherman Grade 3 certificate of competency, to hold an ENS (Fisherman) certificate.

To date, no clear guidelines as to content, duration of study and required level of competence for deck officers serving within the RSA's fishing industry have been included herein.

Goverment Gazette Number 10026, also contains Regulation R.2656, viz. Examination Regulations for Certificates of Competency for Deck Officers, 1985 as amended.

These regulations clearly outline the ENS training requirements for the RSA Merchant Navy fleet, e.g. South African Marine (Safmarine) Corporation Limited and Unicorn Shipping lines.

The guidance given in Regulation R.2656 conforms with the requirements of the International Maritime Organisation's (IMO) STCW Convention of 1978. IMO is a subsidiary of the United Nations (UN), consisting of 135 member states and serves as a forum for discussion relating to maritime matters.

The STCW Convention (1978:3) under Article III (b), exempts fishing vessels from complying with these requirements. Fishing vessels fall under a separate subsidiary of the UN, viz. the Food and Agricultural Organisation (FAO), which has given no guidelines with regard to ENS training for fishermen, to date.

Despite the lack of international and local legislation with regard to the formal training of fishermen in the use of ENS, a course curriculum was compiled in 1986 by the Training Centre for Seamen (TCS) and the South African Department of Transport (SADOT), Shipping Directorate, Marine division (referred to locally as SADOT).

The syllabus tentatively agreed upon by both parties (TCS and SADOT), were in essence that utilised by the Department of Transport in the United Kingdom (UK).

Local legislation governing the content, duration of study and required level of competence for the ENS (Fisherman) course, have to date not been tabled.

The Examination Regulations for Certificates of Competency as Fisherman and Marine Motorman, Regulation R.2853 of 1985, as amended, is currently being revised by SADOT and

will, in all probability, include guidelines for the existing ENS (Fisherman) course.

1.1.1 THE ELECTRONIC NAVIGATION SYSTEMS (FISHERMAN) COURSE

The TCS, a technical college established just outside Cape Town harbour (opposite J - berth, since August 1991) in conjunction with the SADOT, compiled a tentative curriculum for the ENS (Fisherman) course.

This course was initially of five weeks duration, in which the following modules were offered, viz. RDF, Echo sounder, Decca Mark 21, Decca 350T track plotter, Transit satellite navigation (satnav), Radar theory and plotting.

Advances in technology gave rise to the Decca Mark 53G, incorporating the Navstar - GPS module, Shipmate RS2000 receivers and Shipmate RS4000 video track plotters. These additional modules were incorporated into the existing course which in its present form is of six weeks duration.

As the ENS (Fisherman) course is a pre-requisite for those students wishing to write the Fisherman Grade 3 examination, it is offered to South African and foreign (mainly Portuguese) students coming from all spectrums

within the fishing industry, viz. abalone, crustacean trawl, demersal, long-line, pelagic/purse-seine, tuna and those using miscellaneous nets.

This large number of modules presented in such a short period of time, presented certain problems to some of the students.

1.2 STATEMENT OF THE PROBLEM

Having specialised in ENS for fisherman since January 1988 to date, a considerable number of problems experienced by students in this course were identified by the researcher.

Many of the students have a poor command of the English language (the internationally accepted form of communication at sea). This has a detrimental effect on their progress as the lessons, hand-outs and oral examination are in either English or Afrikaans and not the dialect with which they are familiar. The foreign students, mainly Portuguese, experience similar problems, as their command of the English language is just as poor.

Educational background in the case of the older students is severely lacking and in some cases boarders on semi-illiteracy. The younger students, in some cases, lack

exposure to the various on-board electronic navaids prior to joining the course.

In certain cases, the socio-economic background of the student does not provide the ideal studying environment at home, with the result that tasks given for home-study are either poorly done or not attempted at all. The large age differences in certain classes, e.g. a 17 year old cadet versus a 60 year old skipper, leads to frustration as the older students usually with a poor educational background take longer to assimilate data.

1.3 MOTIVATION AND PURPOSE OF THE STUDY

Apart from the ambition and desire to further the researcher's present qualifications, the intention of this thesis is primarily to assist in solving, or at least alleviating some of the problems experienced by the students in the ENS (Fisherman) course.

The purpose of this research project is thus to make an in depth study of certain identified problems experienced by the above mentioned students, viz.

* academic, vocational and socio-economic background
* language competency
* lack of on-board exposure to instrumentation within junior ranks

* large age differences as well as differing levels of experience and competency in one class group.

In addition, it is intended to table the findings, and make possible recommendations with regard to future study and minimum entry qualifications, i.e. both academic and vocational.

1.4 THE RESEARCH GROUP

Cognisance must be taken of the fact that only a limited number of students, viz. a maximum of 8 are allowed to enrol simultaneously for the ENS (Fisherman) course, as this is the maximum number of students the radar simulator can accommodate at any one time.

Larger groups does not allow the lecturer sufficient time to monitor the progress of each individual student effectively. Each course is divided into two groups of ideally 6 students each. The first group of 6 students commence with modules 1 through to 7. The second group commence with modules 8 through to 10. At the end of week three the groups exchange modules until the six week period and all 10 modules are completed. These modules are discussed in more detail in Chapter three.

This implies that the total annual student enrolment for

the ENS (Fisherman) course is approximately 72 (6 courses are offered per annum).

The research group included students who enrolled for the ENS (Fisherman) courses between January 1988 to December 1991. During 1991, only 25 students were enrolled as the TCS moved its ENS laboratory to its new premises opposite J-berth in Table Bay harbour, Cape Town. Simulator equipment had to be disconnected. Re-installation at the new premises was only completed towards mid-November, 1991. Of the 232 students enrolled for this period, a randomly selected sample of 100 were utilised, viz.

* 1988 - 13 out of 63 (21%)
* 1989 - 20 out of 72 (28%)
* 1990 - 42 out of 72 (58%)
* 1991 - 25 out of 25 (100%)

Furthermore, the randomly selected sample of 100 students included the following nationalities, viz. 91 South Africans, 8 of Portuguese and 1 of German origin. South Africans were previously classified by the colour of their skin during the apartheid era into the black, coloured (mixed race), Indian and white statutory population groups. Of the 91 South African students, 82 were coloured and 9 white.

The reason for the dis-proportionately large number of

coloured students is that the TCS, to date, falls under the auspices of the Department of Education and Culture: House of Representatives (catering for the needs of the coloured population group) within the presently constituted tri-cameral system.

The other Houses in this system being:

* The House of Assembly, catering for the needs of the white population group and
* The House of Delegates, catering for the needs of the Indian population group.

To date, the black majority have had no formal representation in Parliament. Presently, a new constitution, with equal representation for all groups, is being negotiated via a forum termed the Convention for a Democratic South Africa (Codesa).

As the TCS is the the largest technical institution presently catering for the training needs of the fishing industry in the RSA, recent changes in legislation intent on moving away from apartheid have made it possible for the TCS to accommodate students of all population groups.

1.5 METHOD OF INVESTIGATION

With a view to investigate the problem and to ultimately

try and improve the situation, a research programme adopting the following strategy is to be conducted, viz.

* Orientation and background study on the history of navigation, the development of the TCS and the ENS (Fisherman) course structure.
* Comparative study of similar courses offered locally and abroad, e.g. Australia, Denmark, Germany, UK and USA.
* Profile of the ENS course lecturers and those lecturing in related courses.
* Opinions of the RSA shipowner within the fishing industry and the SADOT.
* Characteristics of the students and an investigation into the following problems identified, viz. educational, vocational and socio-economic background, poor command of both official languages, language difficulty of foreign students, lack of exposure to instrumentation within junior ranks, reluctance of skippers to engage in on-board training programs and contrasting factors such as age versus experience within the same class-group and distance from home.
* Identification of solutions to the problems stated above, tabling the necessary recommendations and the implications these hold for future study.

The following aids and techniques shall be among those

intended for utilization during the research programme, viz.

* Individual interviews with government officials (SADOT), RSA shipowners and students both past and present on both a structured and unstructured basis.
* Observation of present students and utilization of past student statistics.
* Questionnaire to past students.
* Document analysis of relevant legislation, syllabi both local and abroad, papers from seminars, conferences and symposia and notes from marine courts of enquiry.

The allocation of the chapters hereafter have been carefully selected and arranged to allow the reader some insight into the field of ENS and the problems encountered by students attending the ENS (Fisherman) course.

The researcher intends to categorise the research project in the following manner, viz.

* **Chapter 2** will deal with the history and development of marine navigation and that of the TCS.

  The RSA, although having a relatively large seaboard, have a relatively small maritime industry compared to, e.g. the agricultural industry. It is

therefore not surprising to note that although South Africans generally enjoy going down to the beach in ever increasing numbers, very few are aware of maritime matters.

Using this as a point of departure, the researcher has decided to focus on the history and development of marine navigation systems, i.e. from the earliest methods utilised to what is generally the practice on modern ocean liners to date.

In a country such as the RSA, where division of the population was entrenched by apartheid legislation, it comes as no surprise that many people are unaware of the existence of the TCS, a technical college catering for the needs of students coming from the then statutory coloured population group.

With the pillars of apartheid dwindling, this is no longer the case, as students from all the then statutory population groups are accepted.

A brief history of the TCS is thus also included in this chapter, as this research project would be incomplete if this vital information were to be omitted.

* **Chapter 3** will compare the ENS (Fisherman) course offered by the TCS in the RSA with similar courses offered by the Cape Technikon and South African Navy (SAN) locally and the following institutions abroad, viz. Southampton Institute of Higher Education (UK), Australia Maritime College (AMC), Danish Maritime Authority (DMA), Hochschule Bremen (Germany) and the United States (US) Merchant Marine Academy.

* **Chapter 4** will give a brief review of the ENS (Fisherman) course lecturers, elaborating on their training, qualifications, industrial experience, teaching qualifications, teaching experience and other subjects taught.

* **Chapter 5** intends to test the opinions of the South African shipowner and that of the SADOT about the ENS (Fisherman) course.

* **Chapter 6** will investigate the specific problems experienced by students who have completed the ENS (Fisherman) course, by means of a carefully constructed questionnaire. A randomly selected sample of 100 previous ENS (Fisherman) course students will be used to gather data.

* **Chapter 7** will strive to identify and investigate

possible solutions to those problems mentioned in chapter 6, report on the findings and table possible recommendations.

1.6 SUMMARY

The present chapter focussed on the growth of ENS and the metamorphosis that occurred within the fishing industry in recent years.

Advances in technology and various legislation with regard to quotas, manning and examination requirements necessitated fishermen to upgrade their qualifications and training to meet this new demand.

In the ENS (Fishermen) course numerous problems are identified which will be fully investigated in chapter six. The next chapter will deal with the history and development of marine navigation and that of the TCS.

CHAPTER TWO: THE HISTORY AND DEVELOPMENT OF MARINE NAVIGATION AND THE TRAINING CENTRE FOR SEAMEN

CHAPTER TWO

LIST OF ABBREVIATIONS

BC	Before Christ
CATE	College for Advanced Technical Education
CIS (Previously USSR)	Commonwealth of Independent States
DoD	Department of Defense (sic)
DR	Dead Reckoning
Glonass	Global Navigation Satellite System (CIS)
GPS	Global Positioning System (USA)
Inmarsat	International Maritime Satellite Organisation
LOP	Line of Position/Position Line
Loran	Long Range Navigation System
M	Nautical mile (1852 metres)
MHz	Megahertz
mv	motor vessel
NASA	National Aeronautics and Space Administration
Ro-ro	Roll-on, roll-off vessel
SINS	Ship Inertial Navigation System
Sonar	Sound Navigation and Ranging
ss	steam ship
US-NNSS	United States Navy Navigation Satellite System

USS	United States Ship
USSR (now CIS)	Union of Soviet Socialist Republics

CHAPTER TWO

LIST OF DEFINITIONS

Bakkie — A term widely used, in the vernacular, among RSA fishermen to describe a little wooden/fibreglass, one-man-boat propelled by oars and utilised for catching crayfish (lobster).

Bearing — The direction of an object expressed in terms of compass points or degrees.

Chronometer — A sea-going clock, fitted with gimbals to neutralise the motion of the vessel.

Consol (or Consolan) — An electronic navigation system that provides bearings from a Consol station which transmits 60 signals (dots and dashes in alternate arcs of 15) during one cycle.

Dead Reckoning (DR) — This is the calculation necessary to ascertain the vessel's position by using courses steered and distances run. Used if celestial, terrestrial and electronic navigation are not available.

Fix — The ship's position established on a chart by two or more bearings of known landmarks. Alternatively, two or more

lines of position (LOP) from electronic navaids or celestial bodies, viz. moon, planets, stars and sun.

Gyro compass One which receives its directive power from a gyroscope which in turn is operated by electrically driven rotors. The compass card indicates true north. No variation and deviation need to be taken into account.

Log An instrument used to determine the distance run.

Loran A hyperbolic electronic navigation system (LOng RANge) used to fix the vessel's position at ranges of approximately 1000 nautical miles from the coast.

L1 band 1575,42 Megahertz (MHz)

L2 band 1227,6 MHz

Meridian Great circles passing around the earth from pole to pole and at right angles to the equator (Terrestrial meridians). Celestial meridians pass from pole to pole of the celestial sphere.

Navarho An electronic navigation system consisting of a combination of the Navaglobe and Facom systems, both operating within the 90 to 110

kilohertz bands. Bowditch (1982:50).

Omega A very low frequency (10,2 kilohertz) electronic navaid designed for world wide navigation coverage. Sonnenberg (1978:196).

Radux A electronic navigation system similar to Loran, except that the arrival time of a transmitted pulse was measured in terms of a phase modulation of 200 Hertz, as opposed to the pulse duration of approximately 300 microseconds utilised by Loran. Bowditch (1982:51)

Definitions as per BRADFORD, G. (1980). **The Mariner's Dictionary**. New York: Weathervane Books.

CHAPTER TWO

THE HISTORY AND DEVELOPMENT OF MARINE NAVIGATION AND THE TRAINING CENTRE FOR SEAMEN.

2.1 INTRODUCTION

Nowhere in the documented history of mankind is it recorded who the first person was to proceed to sea in a boat or ship. However, according to Bowditch (1982:1), it is believed that "navigation began with first man."

In all probability man's curiosity, after observing that certain objects remain afloat, led to the manufacture of some sort of water craft which too rendered support. Propelling this craft from a place A to a place B possibly led to the origin of marine navigation.

This concept of taking a craft from A to B as safely and as quickly as possible still prevails to this day.

Contemporary man utilises celestial (heavenly bodies), terrestrial (familiar landmarks) and ENS (land based and satellite transmitters) to navigate their modern-day craft over great distances and at ever increasing speeds.

Historically, a number of great voyages of varying

navigational significance have been recorded. However, extremely little is known of the accomplishments of the ancient mariners and to date the only record to illustrate the various periodic developments in the field of marine navigation, have been acquired from more recent voyages.

2.2 A BRIEF HISTORY OF MARINE NAVIGATION

2.2.1 THE FIRST NAVIGATORS

It is virtually impossible to ascertain which was in fact the first recorded voyage and the navigation principles utilised.

Bowditch (1982:1) indicates that "at about 2200 BC, the time the Tower of Babel is believed to have been built, a general exodus seems to have occurred from a center in southwestern Asia" (Genesis, chapter eleven).

It is believed that the descendents of Noah (Genesis, chapter ten) were eventually scattered over the face of the earth, in all probability reaching their new abodes by sailing across the oceans.

Brinton and Moore (1961:8) verifies that it is only "from the days of the Greeks that we begin to have exact

records of the formulation of the principles on which navigation came to be based."

Bowditch (1982:2) supports the finding of Brinton and Moore and states that

> "one of the earliest well-recorded voyages is known today through the book of observations written by Pytheas of Massalia, a Greek astronomer and navigator. Some time between the years 350 BC and 300 BC he sailed from a Mediterranean port and followed an established trade route to England. From there he ventured north to Scotland and Thule, the legendary land of the midnight sun. He went on to explore Norwegian fiords, and rivers in northwest Germany."

The only evidence we have, with regards to the earlier exodus of the descendents of Noah, is that almost every land reached by the great European explorers, was already inhabited.

Marquard (1954:29) states that the relatively recent great voyages of "Bartholomew Diaz (1486) and Vasco da Gama (1498) who explored the Atlantic coast of Africa" indicates contact with local inhabitants. Similar contact was also experienced by "Chistopher Columbus who reached

America in 1492."

In view of the present-day scenario, it is evident that these latter voyages had a revolutionary effect on Europe and the rest of the world.

2.2.2 SIXTEENTH AND SEVENTEENTH CENTURY NAVIGATION

According to Bowditch (1982:3), Ferdinand Magellan (a disgraced Portuguese nobleman who sailed under the flag of Spain) led an expedition in 1519 which circumnavigated the globe.

Apparantly his equipment included sea charts, parchment skins to be made into charts en route, a terrestrial globe, wooden and metal theodolites, wood and wood-and-bronze quadrants, compasses, magnetic needles, hour glasses and a log which was towed astern (Bowditch 1982:3; Brinton and Moore 1961:9).

This serves to illustrate the marked advances made in the sphere of navigation during the 1,800 years after Pytheas.

Until this stage in the development of navigation, no accurate method in determining longitude was available, possibly due to the shortage of, or non-existence of, the

timepiece (Bowditch 1982:3; Brinton and Moore 1961:17).

2.2.3 EIGHTEENTH AND NINETEENTH CENTURY NAVIGATION

In our every day lives, modern man's entire existence is governed by one seemingly insignificant discovery, viz. the time device. Virtually every event in our lives is coupled with a time perspective. This can be measured in years, months, days, hours, minutes, seconds or micro-seconds.

The chronometer began to emerge two hundred years after Magellan (Bowditch 1982:3; Brinton and Moore 1961:17).

Now navigators could fix their positions more accurately by determining the latitude as well as the previously eluding longitude.

Furthermore, the "voyages of discovery made by James Cook of the Royal Navy in the Pacific Ocean between 1768 and 1779 may be said to mark the dawn of modern navigation" (Bowditch 1982:3).

The most important development during this era according to Bowditch was undoubtedly the chronometer which enabled navigators such as Cook to navigate his vessels with a precision undreamed of by Pytheas and Magellan (Bowditch

1982:3; Brinton and Moore 1961:18).

2.2.4 TWENTIETH CENTURY NAVIGATION

The world is presently witnessing a monumental transformation in the sphere of aeronautical navigation systems, largely attributed to the technological explosion occuring and man's continuous quest for zero defect.

Today, navigators have a wealth of astronomical, mathematical and scientific discoveries, emanating from the previous centuries, at their disposal.

The maiden voyage of the steamship (ss) United States in July 1952 served to illustrate the progress made in navigation during the 175 years since Cook's voyages. It had the most modern equipment, then available, on board such as reliable chronometers, gyrocompasses, logs list of lights, modern, convenient nautical almanacs, sailing directions and sextants to mention a few (Bowditch 1982:3)

2.2.5 ELECTRONICS AND NAVIGATION

2.2.5.1 ELECTRICITY

It is probably difficult to imagine a modern home without

electricity.

The question concerning the origin of electricity now comes to the fore. According to Bowditch (1982:45),

> "Thales of Miletus commented on basic electrical phenomena twenty-five hundred years ago. Until about 1682 the only method of creating electricity was by rubbing glass with silk or amber with wool. In 1864 James Clerk Maxwell of Edinburgh made public his electromagnetic theory of light."

Clucas (1981:43) clearly stipulates the following about Maxwell's theory, viz.

> "light has electromagnetic properties (radio waves, x-rays, gamma-rays, infra-red and ultra-violet rays all possess electromagnetic properties). A current can produce an electric field and under certain circumstances a magnetic field can produce a current in a conductor,"

which many consider to be the greatest single advancement in man's knowledge of electricity.

2.2.5.2 ELECTRONICS

Electronics is probably one of the youngest and most

dynamic engineering sciences known to man to date. Without it, developments such as computers and television with its vast array of integrated circuits and micro-chips, in common everyday use, would not have been possible.

2.2.5.3 APPLICATION OF ELECTRONICS TO NAVIGATION

According to Bowditch (1982:46) "perhaps the first application of electronics to navigation was the transmission of radio time signals in 1904, thus permitting the mariner to check his chronometer at sea."

Electronics presently serves the navigator in a number of ways, such as in communication, direction finding, echo sounding, radar, hyperbolic navaids, satellite navigation systems, gyro compasses, autopilots, navigation bridge and engineroom control systems, to mention a few.

It is indeed true to state that since its inception, electronics have become more enterprising in its application to marine navigation, yielding a seemingly boundless number of sophisticated instruments yearly.

2.2.6 DEVELOPMENT OF HYPERBOLIC RADIO AIDS

Sonnenberg (1978:35) defines a hyperbola as being "the

locus of all points in a flat plane that have a constant difference in distance between two fixed points."

Hyperbolic navigation systems, such as Loran (1943), Decca (1944), Radux (1947), Cytac (1955), Navarho (1957) and Omega (1976) utilize the basic principle as per Appleyard (1981:74) that the precisely known velocity (300 000 000 metres per second) at which radio waves travel between their source (transmitting station) and point of reception (the receiver on board the vessel) determines the distance and ultimately the position of the vessel (Distance = Velocity x Time).

2.2.7 DEVELOPMENT OF SATELLITE NAVIGATION

According to Appleyard (1981:175) "the US Navy Navigation Satellite System (US-NNSS), alternatively known as Transit, was developed under contract for the US Navy between 1958 and 1963 by the Applied Physics Laboratory of the Johns Hopkins University."

The intention of this development, according to Bowditch (1982:54) was to "fulfill the requirement established by the Chief of Naval Operations for an accurate worldwide navigation system for all naval surface vessels, aircraft and submarines."

Appleyard (1981:175) confirms that "in 1967, Transit became available to non-military users, such as merchant navy and fishing fleets world-wide."

2.2.8 DEVELOPMENT OF INERTIAL NAVIGATION

The first Ship Inertial Navigation System (SINS) was developed in 1942, for use in the V-2 missile. In 1958, this system was used to navigate the United States Ship (USS) Nautilus under the ice to the North Pole (Bowditch 1982:54; Cotter 1978:387).

Cotter (1978:388) describes inertial navigation as essentially being

> "a sophisticated Dead Reckoning System in which the motion of the vessel, given its initial velocity, is sensed without compass or log, so that the vessel's position relative to its starting point is at all times known."

He concludes that an important feature of SINS is that

> "it is a self-contained system which functions independently of weather conditions and radio energy."

From an economic viewpoint it is certainly not viable to utilise SINS for commercial use, as there are cheaper

alternatives available. However, it remains of great importance to naval vessels, particularly submarines.

2.2.9 NAVIGATION SYSTEM WITH TIME AND RANGING - GLOBAL POSITIONING SYSTEM (NAVSTAR - GPS)

Currently, there are many electronic navigation systems operational. These are, as stated by Appleyard (1981: 207), still

> "deficient in either its accuracy or area of coverage and so none can be regarded as a universal coastal and ocean navigation aid. However, research and development continues towards perfecting the ideal system, with most attention being directed towards more advanced satellite systems."

According to Hoover & Cerney (1990:50), the Navstar-GPS system

> "is a satellite-based electronic navigation program funded and developed by the US Department of Defense (DoD)."

It should not be confused with the present Transit system also currently in use. These satellites have been in orbit since the early 1960's, but have limited accuracy and their on-board receivers are slow in calculating a

fix, viz. twelve to sixteen minutes from the researcher's experience.

Hoover and Cerney (1990:50) continues that "by the 1970's, the DoD recognised the need for a newer, more accurate satellite navigation system to replace Transit."

The proposed new system, scheduled to be operational by 1989 was to have "total global coverage, an all-weather capability, a quick response time, the ability to give positions in three dimensions and accuracy within a few metres or less."

Skeans (1990:1), reminds us that

> "the Challenger Space Shuttle disaster in February 1986 combined with subsequent failures of the Titan and Delta rockets, threw the GPS deployment schedule, as well as the entire US space program, into disarray.

The Navstar - GPS system is now available for marine navigation and it is alleged that the DoD plans to discontinue the older Transit system by December 1996.

Due to its high accuracy, this system have undoubtedly revolutionised aero, landbased, nautical and space navigation.

2.2.10 GLOBAL NAVIGATION SATELLITE SYSTEM (GLONASS)

Glonass is the former Soviet Union's, now Commonwealth of Independent States (CIS), equivalent of the USA Navstar - GPS.

The CIS and USA have always been engaged in a battle to reign supreme as far as space administration is concerned. Both the CIS Glonass and US Navstar systems are probably evidence of this healthy, or perhaps unhealthy, rivalry.

Etherington (1989:12), indicates that

> "the International Maritime Satellite Organisation (INMARSAT) has in May 1989 commissioned a pair of studies that may lead to the integration of satellite communications and navigation capabilities in a single mobile terminal"

in consultation with the (former) Soviet satellite organisation Morsviazsputnik.

2.2.11 US-SOVIET AGREEMENT ON GPS-GLONASS COMPATIBILITY

It makes good sense to couple these supremely powerful electronic navigation systems and according to Ethering-

ton (1989:13),

> "American and (former) Soviet aviation experts mutually acceded to an ageement that will lead to greater co-operation in the use of GPS and Glonass in the aviation field."

Thusfar, American and (former) Soviet engineers have identified similarities (both operate on L-band frequencies with similar satellite orbital configura- tions) and differences (their navigational signals are substantially different).

Collectively, their objective is to, ultimately, develop performance characteristics and standards for civil aviation GPS/Glonass avionics equipment.

Navigation has certainly taken a quantum leap with the advent of electronics and there is no evidence of it nearing the end of its development. It would appear that progress is inevitable and will continue as long as man remains dissatisfied with the means at his disposal.

2.3 THE HISTORY AND DEVELOPMENT OF THE TRAINING CENTRE FOR SEAMEN

Duvenhage (1988:86), mentions that

> "the history of the TCS in Cape Town is

relatively short, but quite impressive with regard to its spectacular growth and development. This achievement could be considered great, taking into account the difficult circumstances that it had to contend with."

In compliance with the MSA (Act 57 of 1951), as amended, mariners responsible for vessels at sea have to be in possession of certificates of competency.

Harmse et al. (1985:55), states that

"as from January 1964, it became the responsibility of the then Department of Coloured Affairs (presently the Department of Education and Culture: House of Representatives, within the existing tri-cameral parliament) to provide the necessary training facilities for the previously statutory classified coloured population group."

Duvenhage (1988:86,87), continues that courses for mates and skippers from the previously statutory classified coloured population group, were conducted in a single classroom at Spes Bona High School, Athlone (Cape Town), from October 1983.

The Annual Report and Summary of Results of the TCS (1973:1) reveals that these courses were later offered at the Peninsula Technical College, situated in Bellville South near Cape Town. According to Behr (1984:251) this institution, presently the Peninsula Technikon, was established in 1967 and became a College for Advanced Technical Education (CATE) in 1972.

On 1 July, 1970 the TCS became a separate institution in a new building on the campus of the Peninsula CATE was completed and occupied on 5 July, 1973 (TCS 1973:1).

During November 1980, the TCS obtained the 68 metre, 1500 tonne ex-polar supply motor vessel (mv) RSA, built in 1961 (TCS 1980:1).

From January 1982 to June 1991, the TCS occupied three rented premises situated at E-berth, Table Bay. Here theoretical and ENS training, as well as the administrative functions were conducted (TCS 1991:1).

As from July 1991, the TCS took occupation of its own, approximately, 7 million rand designer campus situated opposite J-berth, Table Bay, with all its facilities now localised on one campus.

Short satellite courses at various levels are offered

annually during the off-season for fishing fleets along the west and east coast.

This service is normally offered, upon request, to fishing fleet owners in the following ports, viz. Walvis Bay, Port Nolloth, Lamberts Bay, Stompneus Bay, St Helena Bay, Saldanha Bay, Hout Bay, Gordons Bay, Gans Bay, Mossel Bay and Port Elizabeth.

The phenomenal growth of the TCS in torridly difficult times during the apartheid era, is indicated by the following graphical representation of annual student enrolment for the period 1970 to 1991 (Figure 1).

Figure 1 - ANNUAL ENROLMENTS AT THE TRAINING CENTRE FOR SEAMEN FOR THE PERIOD 1970 TO 1991

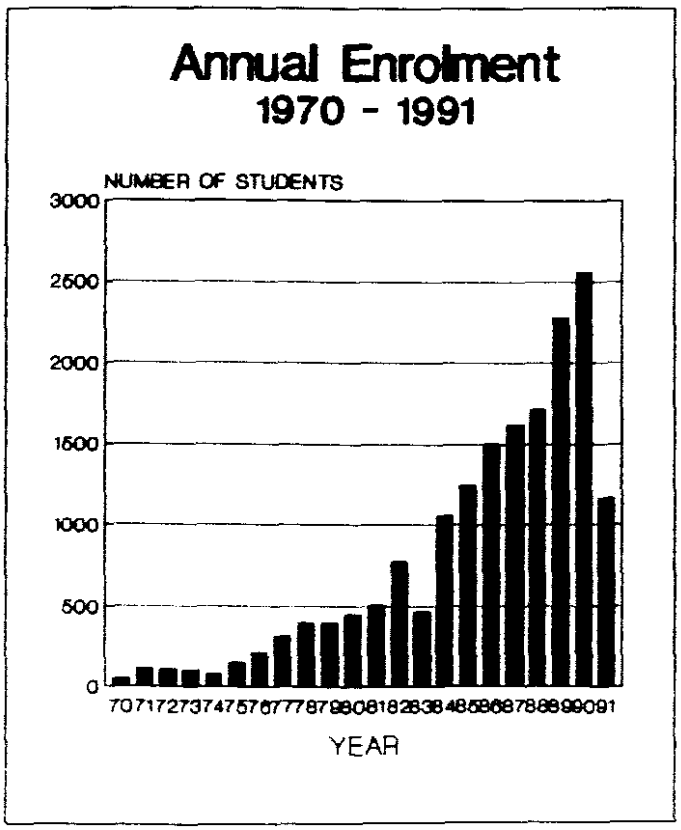

Figure 1 indicates a steady growth in student enrolments for the period 1970 to 1982. For 1983, the annual student enrolment decreased by 311 in comparison with 1982. This could possibly be attributed to the prevailing economic slump, which in turn forced shipowners to streamline their training budgets.

Although small in number, it must be mentioned that during this period, students from the previously statutory coloured population group, were allowed to enrol at the previously all white South African Merchant Navy Academy (SAMNA), General Botha (now Cape Technikon) for the then Second Navigating Officer, Chief Navigating Officer and Master foreign-going courses (refer to Table 3-5 for their present equivalents).

For the period 1984 to 1990, there is a marked increase in the annual student enrolments. This is due to the large numbers (approximately 600 per annum) in the Pelagic Safety (also termed Bakkieman Safety) courses on the west coast, which commenced in 1984.

The 1991 annual student enrolment indicates a sharp decline. This is possibly due to the following reasons, viz.

* No Pelagic Safety courses done by TCS during 1991 (although it is attributed to a poor crayfish

season, this could be a possible indication that a temporary saturation level had been reached).

* Companies, such as Sea Harvest in Saldanha Bay, are providing their own training, in a bid to reduce training costs.
* The relocation of the TCS to its new designer campus during 1991, led to the suspension of the ENS (Fisherman) course for the second semester, to accommodate the transfer of equipment.

Course bookings for 1992 indicate that the TCS's annual student enrolment will decrease even further due to the crippling economic climate, possibly reducing the training budgets of shipowners.

2.4 THE FUTURE OF THE TRAINING CENTRE FOR SEAMEN AND MARITIME TRAINING IN THE RSA

Despite the new era that has dawned in maritime training which requires many adjustments to meet the new demands, the development of the TCS into a fully fledged and independent technical college (under the auspices of the House of Representatives, Department of Education and Culture in terms of the Coloured Persons Education Act, Act 47 of 1963), cannot be overlooked.

Presently, in Cape Town, both the TCS and the Cape Tech-

nikon's School of Mechanical Engineering: Department of Maritime Studies are providing maritime training, albeit to arguably different target groups, viz. TCS (post-school, pre-matric technical vocational training) and the Cape Technikon's Department of Maritime Studies (post-matric or tertiary technical training). Ironically, although these institutions fall under the auspices of differing Houses in the present tricameral parliament, viz. the House of Representatives and the House of Assembly respectively, they enroll people of all the previous statutory population groups, viz. black, coloured, Indian and white.

Future developments, with regards education in the RSA, may lead to the TCS becoming autonomous (at present it is fully subsidised by the State). This implies an inevitable hike in course fees, exerting greater strain on the training budgets of shipowners. The ultimate result could be a further decline in the annual student enrolment of the TCS, accompanied by a reduction in staff This is the scenario experienced by the then SAMNA, General Botha when it became incorporated into the Cape Technikon.

To ensure the survival of maritime training in the RSA, the researcher is of the opinion that the facilities of the TCS and Cape Technikon's Department of Maritime

Studies should be unified. Two separate institutions, having similar objectives and in close proximity to each other, are too costly to sustain in the present economic climate.

Furthermore, the rapid growth of the Victoria and Alfred waterfront complex in Cape Town harbour (similar to the Fisherman's Wharf in San Francisco, USA), the privatisation of the South African Transport Services (now Portnet) and the steady increase in shipping with fading sanctions have presented a problem with regards a suitable berth for the mv RSA.

It is believed that any vessel moored alongside for lengthy periods, as in the case of the mv RSA, does not serve the training need intended, i.e. practical hands on training at sea. Ships were after all designed to sail. Training aspects of vital importance such as the taking of terrestrial and celestial bearings, practical navigation, passage planning, chartwork, radar plotting, radio communication, piloting, catering and engine room watchkeeping, to name a few, cannot effectively be taught and monitored by a vessel lying alongside.

It must be borne in mind that training should be market related and a 31 year old vessel cannot possibly satisfy that specific need, as many of her instrumentation,

machinery and equipment have become obsolete.

Exorbitant operation costs (approximately R210 000,00 per annum), together with dwindling student numbers during 1991, as depicted in figure 1, will in all probability compel the TCS to relinquish the mv RSA as a training facility in the future.

A specially designed training motor vessel, catering for the entire maritime industry (fishing, merchant navy and off-shore operations) is probably the ideal solution.

This may initially seem as a costly venture, but it would probably, in the long term, be cheaper than remedying costly maritime disasters, such as:

* Loss of human life due to sinking. The roll-on, roll-off (ro-ro) passenger/vehicle ferry, Herald of Free Enterprise sunk at Zeebrugge, Belgium on 6 March, 1987 with the tragic result that 150 passengers and 38 members of the crew lost their lives (Report of Court 1987:1).
* Groundings. The 301 metre long Exxon Valdez seriously polluted the environment with 267,000 barrels of crude oil, upon striking Bligh Reef, Alaska on 24 March, 1989 (Marine Log 1989:20).
* Collisions. On 16 March, 1992 a collision between the Fathulkhair and Onibe, which sank 12 nautical

miles off Quoin Point, near Cape Agulhas, led to oil pollution of the environment (Sunday Times 1992:1), all due to human error.

There are many variables leading up to and finally culminating in a maritime disaster. However, if a price is put on maritime training, ultimately, the increased cost of re-training and remedying disasters will serve as evidence of previous short-term savings.

A more flexible alternative would be to invest in simulator equipment which may be upgraded with the advent of new technology (The radar simulators of both the Cape Technikon and TCS are ageing and needs to be replaced as upgrading is virtually impossible). As the import of simulators from abroad becomes extremely costly with the present rand-dollar or rand-pound exchange rates, it makes good sense to have one maritime institution instead of duplicating as was done in the apartheid era.

The Cape Technikon's Granger Bay campus with facilities such as:

* a fully enclosed, heated swimming pool,
* hostel,
* recreation facilities,
* restaurant with bar,
* slipway (dry-dock facility),

* small-boat harbour and

* survival centre

is ideally suited and situated to serve as the new unified maritime facility in the RSA. Presently it is largely utilised by the Department of Hotel and Catering Studies of the Cape Technikon.

It is indeed regrettable that apartheid politics and personal differences of the past have made a highly regarded maritime, facility with its huge potential for expansion, virtually inaccessible to a large number of students presently serving within the fishing industry of the RSA.

Dwindling sanctions imply a boom within the merchant navy and fishing industries. It is thus imperative that maritime training must be normalised to render the best possible service to prospective students.

Hopefully, through collective brain-storming and negotiation, maritime training in the RSA will be unified in the near future, burying the infamous past for good.

2.5 SUMMARY

In the foregoing chapter, attention was focussed on the history and development of navigation as well as that of

the TCS.

It was pointed out that navigation is as old as civilisation itself. It can be defined as the art of taking a vessel from place A to B, as safely and as quickly as possible.

Although the basic principle remains the same, the modern navigator's task is far more complicated than in ancient times because of the distances that must now be covered at ever-increasing speeds. This complicated task, however, have been simplified by mathematical and scientific discoveries which have been applied to navigation in many different ways. Astronomy gave rise to celestial navigation. The chronometer solved the longitude problem and the discovery of electricity in the 18th century played a vital role in present day electronic navigation systems.

Progress in the development of navigation is unlikely to cease. Vast sums of money is spent yearly in various developmental projects throughout the world in man's race for supremacy.

For as long as the threat of war prevails, navigation systems in its array of forms will be in existence to guide missiles, aircraft, ships and spacecraft.

The present knowledge explosion we are experiencing will perhaps produce new, innovative navigation systems in the not too distant future.

Due to the extremely low level of awareness with regard to the maritime industry, it was necessary to include a briefing on the history and development of navigation and the TCS.

In the next chapter, a comparative study will be made between the ENS (Fisherman) course offered by the TCS and similar courses offered at local institutions as well as those in Australia, Denmark, Germany, UK and USA.

CHAPTER THREE: ELECTRONIC NAVIGATION SYSTEMS COURSES - A COMPARATIVE STUDY

CHAPTER THREE

LIST OF ABBREVIATIONS

ADF	Automatic (radio) direction finder
AM	Amplitude modulation
AMC	Australian Maritime College
ARPA	Automatic Radar Plotting Aid
CAS	Collision avoidance system
CATE	College for Advanced Technical Education
cert	certificate
cm	centimetre
COLREGS	International Regulations for Preventing Collisions at Sea, 1972, as amended
COQ	Combat Officer Qualifying
crt	cathode ray tube
CVP	Colour video plotter
DMA	Danish Maritime Authority
DoT (UK)	Department of Trade
DoTC (Australia)	Department of Transport and Communications
ENS	Electronic Navigation Systems.
FM	Frequency modulation
Gov.	Government
GPS	Global Positioning System
grt	gross registered tonnes
IMO	International Maritime Organisation
kg	kilograms

kms	kilometres
lat/long	latitude/longitude
lbs	pounds
Loran	Long range navigation system
Mk	Mark
M Dipl Tech	Masters Diploma in Technology
MSA	Merchant Shipping Act, Act 57 of 1951, as amended
NC	National Certificate
ND	National Diploma
NHC	National Higher Certificate
NHD	National Higher Diploma
N Laureatus	National Laureatus
NTC	National Technical Certificate
NTD	National Technical Diploma
Nat.	National
Navaids	Navigational aids
Navstar	Navigation system with Time and Ranging
n.d.	no date
NIS	Navigation Information Systems
PADS	Predicted areas of danger
PM	Pulse modulation
prf	Pulse repetition frequency
radar	Radio detection and ranging
RDF	Radio direction finder
RSA	Republic of South Africa
rx	receiver

tx/rx	transmitter/receiver (transceiver)
Safmarine	South African Marine Corporation Limited
SADOT	South African Department of Transport
SAMNA	South African Merchant Navy Academy
SAN	South African Navy
SAS	South African Stevedores
Satcom	Satellite communication
Satnav	Satellite navigation system
sonar	Sound navigation and ranging
SSB	Single side band
Std	Standard
TCS	Training Centre for Seamen
TSIT	Tasmanian State Institute of Technology
tx	transmitter
US	United States
USA	United States of America
USMMA	United States Merchant Marine Academy
VCR	Video cassette recorder
vhf	very high frequency
vs	versus
yr	year

CHAPTER THREE

LIST OF DEFINITIONS

aft Towards the stern of a vessel.

athwartships At right angles to the fore and aft line of a vessel.

Bellini-tosi antenna A development by Bellini and Tosi in 1909 of a RDF antenna based on two fixed loops at right angles to each other. In a marine RDF installation the antenna is positioned such that the one loop lies along the vessel's centre line, the other being athwartships. The two loops are subsequently referred to as the fore-aft loop and port-starboard loop respectively (Appleyard 1981:34).

certificated officer A master or a ship's officer holding a certificate of competency granted in terms of section 75(1) of the MSA (Regulation R.2652 1985:1).

certificated fisherman A person who holds a certificate of competency granted in terms of section 75(1) of the MSA (Regulation R.2653 1985:18).

Channel 16 VHF 121,5 MHz

coasting ship A ship employed in plying between ports

in the same country but does not include any fishing, sealing or whaling boat (Regulation R.2652 1985:2).

(radar) display Usually a long persistence phosphor, cathode ray tube. On this tubeface the echo of the target is displayed as a bright spot at a distance from the origin of the display which is proportional to the actual range of the target (Bole and Jones 1981:3).

fishing boat/ vessel Any vessel used commercially for catching fish, whales, seals or any other living resources from the sea (Regulation R.2652 1985:2).

foreign-going ship A ship plying between a port in one country and a port in another country, but shall exclude any such ship engaged in limited voyages or operations.

fore Towards the front (foremast) of a vessel.

limited Restricted to within the sea area adjacent to the southern African coast between the limits of Cape Delgado in the east and the Congo River in the west and extending 250 nautical miles from the shore (Regulation R.2652 1985:2).

log A device to determine distance run by a

ship e.g. electromagnetic, doppler and pressure logs.

loop antenna Circular (rectangular or triangular) arrangement used to receive radio waves.

mate Officers under the master who assist him in operating a merchant vessel (Bradford 1980:167).

matric (Senior) certificate Awarded upon the successful completion of twelve years of schooling, i.e. 6 years primary and 6 years secondary education (Cilliers & Muller 1987:2,3).

NTC National Technical Certificate, denotes post-school craft training offered by technical colleges and technical institutes, e.g. NTC 1 to NTC 5.

NTD National Technical Diploma, denotes post-school advanced craft training offered by technical colleges and technical institutes; the NTD is awarded upon successful completion of the NTC 6 course.

NC National Certificate, denotes technician or commercial training by technikons at tertiary level up to and including the T1 stage.

NHC National Higher Certificate, denotes technician or commercial training

offered by technikons at tertiary level up to and including the T2 stage.

ND National Diploma, denotes technician or commercial training offered by technikons at tertiary level up to and including the T3 stage.

NHD National Higher Diploma, denotes advanced technician or commercial training offered by technikons at tertiary level up to and including the T4 stage.

Masters Diploma in Technology Masters Diploma in Technology, denotes technologist or advanced commercial training offered by technikons at tertiary level up to and including the T5 stage.

National Laureatus in Technology National Laureatus, is awarded by technikons at tertiary level upon successful completion of the T6 course.

master In relation to a ship, any person (other than a pilot) having charge or command of such ship (Regulation R.2652 1985:2).

Midshipman A student at a naval academy ranking next above cadet (Sykes 1978:552).

own ship position A cubicle representing a ship i.e. one having all the instrumentation and characteristics as a ship.

port (1) The left side of a vessel, looking forward. Originally derived from the fact that the ships in the 17th century had their only loading port on the left side (Bradford 1980:199).

port (2) Means a place, whether proclaimed a public harbour or not, and whether natural or artificial, to which ships may resort for shelter or to ship or unship goods or passengers (Regulation R.2652 1985:3).

Qualifying sea-service Sea-service on the appropriate vessel and in the appropriate department in which the examination will be conducted. e.g. Time served on fishing vessels in the deck department qualifies the student to enrol for the ENS (Fisherman) course.

rasterscan radar display Comprises 625 horizontal lines forming the radar picture. Has a short persistence cathode ray tube.

rating A seaman other than a ship's officer (Regulation R.2652 1985:2).

restricted Retricted to defined operations from a stated port or place.

restricted visibility The term 'restricted visibility' means any condition in which visibility is

restricted by fog, mist, falling snow, heavy rainstorms, sandstorms or any other similar causes (Cockcroft and Lameijer 1982:26 - extract of Rule 3 (1) of Colregs).

seaman Any person (except a master, pilot or apprentice-officer) employed or engaged in any capacity as a member of the crew of a ship (Regulation R.2652 1985:2,3).

ship Any kind of vessel used in navigation not propelled by oars.

ship's officer A navigating officer or engineer officer, whether certificated or uncertificated, employed as such aboard a ship, but does not include a master.

short sea Restricted to an area of not more than 500 nautical miles in length and extending 250 nautical miles from the shore between the limits of Punta Do Oro and the mouth of the Kunene River (Regulation R.2652 1985:2,3).

starboard The right side of a vessel, looking forward. It dates back to the time when a steering board was used on the right side of a vessel and became corrupted into starboard (Bradford 1980:256).

stern The after part of a vessel.

testimonials Testimonials satisfactory to the examiner as to character (including sobriety), experience, ability and general good conduct on board ship. Such testimonial shall cover the last 12 months of qualifying time immediately preceding the date of application (Regulation R.2653 1985:18).

tonne Unit of measurement of a ship´s tonnage (1000 kg). Equivalent emperial measures are long tons (2240 lbs) and short tons (2000 lbs) (Sykes 1978:960).

vectorscan radar display The trace (sweep) rotates the pulse repetition frequency, forming the radar picture. It has a long persistence cathode ray tube.

vessel The word ´vessel´ includes every description of watercraft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water (Cockcroft and Lameijer 1982:25 - Extract of Rule 3 (a) of Colregs).

visibility The transparency of the atmosphere.

X-band radar Most commonly used marine radar, using a wavelength of 3cm (Burger 1983:9).

CHAPTER THREE

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CHAPTER THREE

ELECTRONIC NAVIGATION SYSTEMS COURSES - A COMPARATIVE STUDY

3.1 INTRODUCTION

This chapter will focus on the development and content of the ENS course, offered by the TCS in Cape Town, RSA.

A comparative study will also be made of similar courses offered by the Cape Technikon, established for the then statutory white population group (the Population Registration Act, one of the corner-stones of apartheid legislation, was repealed during the 1991 parliamentary sitting) and the South African Navy (SAN).

Institutions responsible for similar training in the following countries, viz. Australia, Denmark, Germany, UK and USA will be included in this study.

3.2 THE DEVELOPMENT OF THE ENS COURSE OFFERED BY THE TCS

With the mechanism for maritime training of the coloured population group in place (albeit separate due to the apartheid policy), viz. TCS occupying its own premises at the Peninsula CATE in 1973, courses of training for

higher levels of qualifications could be offered for coloured youths seeking employment within the merchant navy. Up to this stage, officer training within the merchant navy was limited to white youths only.

The Annual Report of the TCS (1974:1) verifies that

> "at the beginning of January 1974, Unicorn Shipping Lines enrolled eight coloured youths with a matric qualification as cadet officers. Three were to undergo training as deck officers and the remaining five as engineering officers."

In order to become eligible for the SADOT examination for the Certificate of Competency as Second Navigating Officer on foreign-going vessels (Deck Officer - Class 3), all deck cadet officers had to obtain the following ancillary certificates, viz.

* First Aid at Sea
* Marine Fire Training
* Restricted Radiotelephone Operator and the
* Radar Observer in Merchant Ships certificate.

Due to the fact that maritime education and training at this stage was racially segregated, the TCS had to implement the aforementioned ancillary courses.

An interview with Captain A S Morris (1990), principal of

the TCS, confirmed that no radar facilities were then available at the TCS. However, adequate facilities were in existence at the then SAMNA, General Botha (now serving as a satellite campus for the Cape Technikon's Departments of Hotel and Catering and Maritime Studies), situated at Granger Bay.

Existing legislation at that time, viz. The National Education Policy Act, 1967 (Act 39 of 1967) as amended, (empowering the Minister of National Education to provide education to white persons in schools) together with The National Culture Promotion Act, 1969 (Act 27 of 1969) providing for the "preservation, development, fostering and extension of culture of the white population of the Republic by the planning, organization, co-ordination and provision of facilities for the utilization of leisure and informal out-of-school education" determined that facilities be used only by students of the white population group, due to the apartheid system.

Behr (1984:64) recalls, "in 1983, Act 27 of 1969 was repealed and replaced by the Culture Promotion Act, 1983 (Act 35 of 1983) where provision was now made for the preservation, development fostering and extension of culture for all population groups."

In a letter addressed to the TCS (1990), Captain H F

Stohr, present Head of the Cape Technikon's Department of Maritime Studies, confirmed that "the SAMNA have been incorporated into the Cape Technikon's School of Mechanical Engineering, Department Maritime Studies, providing post-matric (tertiary) maritime education and training" for all population groups as determined by the Advanced Technical Education Amendment Act, 1983 (Act 84 of 1983).

Captain Morris (interview:1990) further reveals that South African Marine (Safmarine) Corporation Limited and Unicorn Shipping Lines requested the then Administration of Coloured Affairs in co-operation with the Department of National Education, to provide the TCS with a three week Radar Observer course run by the SAMNA.

At that stage, the course structure was such that the syllabus for the Radar Observer's course was incorporated into the time-table of the Second Navigating Officer (Foreign-going) course for the white students.

This implied that radar tuition was allocated a few hours per week only. The coloured students had to disrupt their Second Navigating Officer (Foreign going) tuition in Bellville, in order to attend the radar lectures provided at the SAMNA. This method of tuition in radar eventually proved to be impractical. Valuable tuition time was lost

in commuting between the TCS's Bellville campus and the SAMNA, to the detriment of the student's progress.

The TCS was forced to re-evaluate the radar training facilities at hand. A radar set, powered by a generator, was fitted in a caravan and came into use in early 1976 (n.d.). For practical tuition, the caravan was towed from the TCS's Bellville campus to a site near Mouille Point lighthouse, where vessel movement in and out of Table Bay harbour could be monitored by radar.

The TCS could now offer training in the use of radar for coloured students. The course was run for three consecutive weeks and the first Certificate as Radar Observer in Merchant Ships issued by the TCS, was dated 05 April, 1976.

The training of coloured youths who were to serve as officers in the merchant navy was by now well established. The Annual Report of the TCS (1977:1) noted that "during January 1977, Safmarine Corporation Limited followed the example set by Unicorn Shipping Lines in 1974, and employed twelve cadet officers (six deck and six engineering) from the coloured population group."

In conclusion, Captain Morris (interview:1990) states that the rapid growth of marine training within the

coloured population group, inspired the TCS to acquire the supply vessel RSA as a training ship in November 1980. By January 1982, all the TCS's facilities were moved from its Bellville premises to Table Bay harbour.

3.2.1 THE ENS (FISHERMAN) LABORATORY

A need for an ENS (Fisherman) laboratory existed and from January 1981 to date, the TCS acquired the following simulator equipment and electronic navaids according to its 1992 ENS inventory, viz.

* Decca simulator (Simrad XD 202)
* Echo sounding/fishfinding simulator (Simrad XE 201)
* Radar plotting trainer (Simrad XR 202)
* Transit simulator (Simrad XT 201)
* Vessel simulator (Simrad XV 203)
* Simrad Signal generator
* Watanabe X-Y co-ordinate plotter
* Commodore C13M 4040 dual floppy disc drive
* Decca Mark (Mk) 21 receiver (rx)
* Racal-Decca 10355 latitude/longitude converter
* Racal-Decca Mk 53G (GPS) rx
* Shipmate RS4000 rx
* Shipmate RS2000 colour video plotter
* Decca 350T track plotter
* Skipper 802 graphic echo sounder (dry paper)
* Skipper CS 116 colour video sounder

* Simrad ET100 echo sounder (dry paper)
* Furuno sonar
* Raytheon 1603 rasterscan radar (live)
* Decca X-band vectorscan radars (3 x 30 centimetre (cm) display units, of which one can be used live and 1 x 23 cm display unit. All four are used during simulation)
* Spare slotted waveguide antenna and miscellaneous spare parts of the radar for demonstration purposes
* Furuno FSN 90 Transit rx
* Furuno ADF-5 Mk II RDF (live)
* Decca 450, auto-pilot
* Frydenbo steering gear
* Aiphone communications system
* Marinetek TM portable, very high frequency (VHF) radio transceiver
* 2 x Raytheon Automatic Radar Plotting Aids (ARPA's) and scanner units (not in use presently)

During July 1991, the ENS (Fisherman) laboratory was moved from its rented premises (South African Stevedores) at E-berth to its present tailor-made campus overlooking J-berth, Table Bay harbour. Due to this disruption, no ENS (Fisherman) courses were offered during the second semester of 1991.

The new campus comprises a navigation bridge (also used

for lecturing purposes), various navaids, a simulator control room, four radar cubicles (simulation), one live radar cubicle, two lecture halls, cafeteria, store-rooms and lecturers' offices.

The radar simulator is able to drive, in real time, one own ship position. Each of the four radars used for simulation would thus display the same data in a scenario. The own ship position is provided with radar, plotting table, time clock, compass and ship's speed read-out, manual plotting aids and appropriate charts. A simulated radiotelephone communications system is provided for ship-to-ship and ship-to-shore (instructor's position) communication.

Rule 35 of the International Regulations for Preventing Collisions at Sea, 1972 as amended, deals with "sound signals in restricted visibility". During radar simulator exercises, these sound signals are transmitted via a radio cassette-recording to each cubicle.

Live radio broadcasts are obtained on channel 16 VHF, via a portable radio transceiver monitoring traffic movement in Table Bay. These broadcasts are relayed to each of the four cubicles.

The lecture halls are used for briefing and de-briefing

during radar simulator exercises.

Extensive use is made of personal computers and a video cassette recorder (VCR) to assist the students in visualizing concepts they often have difficulty with, e.g. electromagnetic theory. A library containing computer software and video cassettes for use with the VCR system, is available to the lecturer.

Due to the exorbitantly high import costs involved (the result of a weak Rand) with regard to the upgrading of the existing radar simulator equipment, the TCS have initiated their own radar simulator research programme which is personal computer (IBM compatible) based.

3.2.2 THE ENS (FISHERMAN) COURSE STRUCTURE

In 1986, the TCS together with the local fishing industry and SADOT developed the ENS (Fisherman) course as follows, viz.

Duration of course: Six weeks, including examination in each module (258 periods/193,5 hours).

Number of periods weekly: 43

Duration of each period: 45 minutes

Table 3-1 sets out the course program for the ENS (Fisherman) course.

Table 3-1 ENS (FISHERMAN) COURSE PROGRAM

WEEK		MODULE	HOURS
One	1.	Radio Direction Finder	13.50
Two	2.	Echo Sounder (Graphic and CVS)	18,75
	3.	Transit satellite navigation system and an introduction to GPS	13,50
Three	4.	Decca Theory/Mk 21 rx practical	18,75
	5.	Racal-Decca Mk 53G rx practical	13.50
Four	6.	Shipmate RS 4000 rx	13,50
	7.	Track plotters 350T and Shipmate RS2000	05,25
	8.	Radar (Theory)	18,75
Five	9.	Radar (Practical setting up)	13,50
	10.	Radar (Plotting - vector triangle)	32.25
Six	11.	Radar (Collision avoidance and radar navigation - by means of simulation)	32.25
		Total:	193.50

Presently, the ENS laboratory only have four radar cubicles and as a result a maximum of eight students are allowed to enrol per class. In week six of the course, the students are divided into four groups of two each. During this period (collision avoidance and radar navigation by means of simulation) each student is given the opportunity to serve as skipper, monitoring the radar and mate, radar plotting, using the vector triangle and fixing the vessel's position on the chart.

Of late, due to the demand to obtain an ENS certificate

(a pre-requisite for the Fisherman Grade 3 examination), the TCS was forced to accommodate two class groups commencing simultaneously, i.e. a total of sixteen students. The first group of eight students commence with modules 1 through to 7, using the navigational bridge as a base. The second group commence with modules 8 through to 10, using the lecture hall and radar simulator room as a base. At the end of week three, both class groups change venues in order to complete the remaining modules. Two lecturers, one for each class group, is thus employed by the TCS to satisfy this requirement.

Upon completion of each module the students are assessed on their practical ability to operate the individual instruments. These assessments are competency based, implying that the student will have to demonstrate his ability to operate each individual instrument with one hundred per cent (100%) accuracy.

Oral and/or written questions, arising from the theory, e.g. effects of errors, misalignments and accuracy, accompany these practical assessments. In these, the student have to obtain seventy per cent (70%) of the marks available in order to pass.

Neither the Examination Regulations for Certificates of Competency as Fisherman and Marine Motorman (R.2653) or

the Examination Regulations for Certificates of Competency for Deck Officers (R.2656), 1985 as amended, provide guidelines for the ENS (Fisherman) syllabus. As a result, the TCS have adopted as a guideline, the syllabus of the ENS (Fishing) course offered in the UK.

3.2.3 ENS SATELLITE COURSES

The TCS conducts Fisherman Grade 4 courses at various centres along the east and west coast of the Republic of South Africa, upon request of the shipowners or as the need arises. These courses are generally conducted in the off-season or after the fishing quota has been met.

The majority of the vessels on which these students are serving, are less than 100 tonnes and operate within 50 nautical miles of the shore. Current legislation, outlined in table 3-3, exempts these students from the formal ENS (Fisherman) course. However, the Fisherman Grade 4 syllabus, as per Regulation R.2653 (1985:25) states that candidates should be au fait in

> "the practical use and limitations of electronic navigation systems currently found on a large proportion of fishing vessels, e.g. Decca, echo sounder, electronic logs, radar, radio direction finder and satellite navigator."

As a result, the TCS have incorporated basic ENS modules in the Fisherman Grade 4 course, as a vast number of students have no or scant knowledge of the electronic navaids fitted to the vessels on which they serve.

According to Duvenhage (1988:126), it was found that

> "skippers are in general extremely reluctant to train members of their crew. They jealously guard their knowledge and skills and feel threatened by the upwardly mobile younger generation, i.e. those crew members who display an interest in learning. Their usual reaction is not to allow any person, except the mate, onto the bridge."

To overcome this problem, the following electronic navaids are made available by the TCS for hands on tuition, viz.

* Dummy Decca Mk 21 rx
* Taiyo Auto RDF and a Bellini-Tosi antenna (live)
* Furuno echo sounder

It is common practice for the course lecturer to liaise with industry for permission to use the equipment fitted to their vessels. Practical tuition in the correct use of Decca/Shipmate, echo sounder, radar, RDF and Transit can thus be provided in an environment familiar to the

student.

These courses are of a purely orientational nature and is only offered to students wishing to enrol for the Fisherman Grade 4 examination (lowest officer qualification). It is of two weeks duration and no certificate is issued upon completion.

Of late, the frequency of ENS satellite courses have decreased due to the fact that the state no longer provides financial assistance for the subsistance and travelling costs incurred by the satellite course lecturer. These costs are now borne by the fishing company requesting tuition.

As a result, fishing companies such as Sea Harvest based in Saldanha Bay, have begun their own in-house training schemes.

3.2.4 STATUTORY REQUIREMENTS

Table 3-2 indicates the educational level of the various certificates issued by SADOT in comparison with existing national qualifications in the RSA as per Cilliers and Muller (1987:66,67).

The non-national qualifications marked (*) were revoked

by the Minister of National Education in December 1991, according to NATED 02-151 (91/01).

Table 3-2 HIERARCHY OF MARINE (DECK) QUALIFICATIONS

TECHNICON	MERCHANT NAVY	FISHING INDUSTRY	TECHNICAL COLLEGE
T6 National Laureatus in Technology			
T5 Masters Diploma in Technology	* Master(Special Grade)		
T4 National Higher Diploma	* Deck Officer Class 1 (Master Mariner		
T3 National Diploma	* Deck Officer Class 2 + Master (Short Sea) Endorsement		National Technical Certificate (NTC) 6
T2 National Higher Certificate	* Deck Officer Class 3 or Class 4 + Master (Short Sea) Endorsement.	* Fisherman Grade 1	NTC 5
T1 National Certificate	* Deck Officer Class 5	* Fisherman Grade 2	NTC 4
SECONDARY EDUCATION			
Std X (Matric)	* Deck Officer Class 6	* Fisherman Grade 3	NTC 3
Std IX		* Fisherman Grade 4	NTC 2

* The post-matic courses offered to the merchant navy have been replaced with suitable national qualifications. Ideally, the remaining pre-matric courses and those offered to the fishing industry should also be replaced by suitable national qualifications.

Table 3-3 outlines the documents required to become eligible for the Fisherman Grade examinations as directed in Regulation R.2653 (1985:17), as amended.

Table 3-3 DOCUMENTS REQUIRED FOR THE GRADE (FISHERMAN) CERTIFICATE OF COMPETENCY EXAMINATION

	DOCUMENTS REQUIRED	FISHERMAN GRADES			
		4	3	2	1
1.	Testimonials	*	*	*	*
2.	Identity Document	*	*		
3.	Health Certificate	*	*	*	*
4.	Sight Test Certificate	*	*	*	*
5.	Proof of service at sea	*	*	*	*
6.	First Aid at Sea certificate		*	*	
7.	Practical First Aid (Fisherman)	*			
8.	Fire fighting course certificate (ratings)	*			
9.	Fire fighting course cert.(officers)		*		
10.	Restricted Radiotelephone Operators certificate (marine)	*	*		
11.	Proficiency in Survival Craft certificate			*	
12.	ENG Certificate (Fisherman)		*		
13.	Ship Captain's Medical Training certificate				*
14.	Fishing Technology certificate			*	
15.	Previous certificate of competency		*	*	*

Frequently difficulty is experienced by fishermen to submit the documents referred to in items 6 to 14 of Table 3-3 above. The dates these courses are offered frequently coincide with the fishing season. In addition, these courses allow limited numbers only. Course bookings are thus processed on a first come, first served basis. Fishing, being their livelihood, takes precedence until a

suitable booking on a particular course can be obtained.

According to Regulation R.2653 (1985:17), as amended, the SADOT made provision for fishermen to qualify for the Fisherman Grade examinations, provided that outstanding documents are produced within a period of 24 months from the date of passing that specific Grade examination. In this interim period, no Certificate of Competency will be issued. Sea-time acquired will not be valid for the next higher certificate examination.

Table 3-4, as per Regulation R.2656 (1985:110), as amended, will assist to distinguish between the additional qualifications required for the Deck Officer Class Certificates of Competency within the merchant navy.

Table 3-4 ADDITIONAL QUALIFICATIONS FOR CLASS 1 DECK CERTIFICATE OF COMPETENCY EXAMINATION

	ADDITIONAL QUALIFICATION	CLASS OF CERTIFICATE OR ENDORSEMENT									
		1	2	2 -	3	3 -	4	4 -	5	5 -	6
1.	Sight Test certificate	x	x	x	x	x	x	x	x	x	x
2.	Navigation Control course	x	x	x		x		x		x	
3.	First Aid at Sea				x		x		x		x
4.	Ship Captain's Medical Training certificate	x	x	x		x		x		x	
5.	Fire fighting course certificate				x		x		x		x
6.	ENS course				x		x		x		
7.	Efficient Deck Rating certificate				x		x		x		
8.	Efficient Lifeboatman certificate				x		x		x		x
9.	Restricted certificate of competence in Radiotelephony				x		x		x		x

+ Indicates the Master (Short Sea Trade) or (Limited Trade Steward Endorsement.

Regulation R.2656 (1985:109), as amended, in addition specifies that "every candidate for a Class 3 certificate shall hold a higher academic qualification (matric/senior certificate) which shall include a pass in Mathematics and Physical Science."

The Minister of Transport has determined that Certificates of Competency issued after Regulation R.2652 of 1985, as amended, are to be equivalent to certificates granted in terms of section 75 (1) of the MSA.

Table 3-5 below as per Regulation R.2652 (1985:14), as amended, depicts all these certificates and their respective equivalent certificates.

Table 3-5 TABLE OF EQUIVALENT CERTIFICATES

	NAME OF CERTIFICATE PRIOR TO THE MANNING REGULATIONS, 1985	EQUIVALENT CERTIFICATE
1.	Master (Foreign-going)	Deck Officer Class 1
2.	Chief Navigating Officer (Foreign-going)	Deck Officer Class 2 + Master (Short Sea Command Endorsement
3.	Second Navigating Officer (Foreign-going)	Deck Officer Class 3
4.	Master (Coasting)	Deck Officer Class 4 + Master (Short Sea Command Endorsement
5.	Navigating Officer (Coasting	Deck Officer Class 5
6.	Skipper (more than 100 tons	Fisherman Grade 2
7.	Mate (more than 100 tons)	Fisherman Grade 3
8.	Boatswain (more than 100 tons)	Fisherman Grade 4
9.	Skipper (under 100 tons	Fisherman Grade 4
10.	Mate (under 100 tons)	(No equivalent)

3.3 THE CAPE TECHNIKON COURSES

A letter addressed to the TCS from Captain H F Stohr, present Head: Department of Maritime Studies, confirmed that the SAMNA, General Botha, became amalgamated with the Cape Technikon as from June 1990, assuming its new name, viz. Department of Maritime Studies - School of Mechanical Engineering, Cape Technikon.

The letter further elaborates that the Department of Maritime Studies offers full-time courses at the National Diploma (ND) and National Higher Diploma (NHD) levels in Maritime Studies. These courses also form part of the SADOT Deck Officer Class 2 and Class 1 (Master Mariner) certificate of competency, external examinations respectively.

Navigation Information Systems (NIS), previously ENS, Navigation Control and the ARPA course are among the short courses offered. Part-time courses, under the auspices of the Bureau for Continuing Education of the Cape Technikon include, among others, courses in NIS for yachts and smallcraft.

3.3.1 NAVIGATION INFORMATION SYSTEMS COURSES

As specified in Regulation R.2656 (1985:158,159), as

amended, NIS training for merchant navy deck officers is divided into three stages, viz.

* Stage A - First college phase.
* Stage B - Sea phase (observation and practical).
* Stage C - Final college phase.

During Stage A the trainee deck officer is to be made aware of the basic principles of operating the various electronic navaids.

Upon completion of this stage, the trainee should have acquired a level of operational competence, whereby accurate navigational information can be provided to the bridge watch-keeping team during the succeeding sea phase.

Stage B should allow the skills and knowledge aquired in Stage A to be consolidated. Under the supervision of a certificated officer, all the navaids fitted aboard the vessel should be utilised by the trainee.

The final college phase, Stage C, is to develop a wider appreciation of navigational systems, together with an understanding of the accuracy, availablility, limitations and use of navaids in the context of overall requirements for navigation.

An interview with Captain K M T Cox (Marine consultant and part-time NIS course lecturer) in August 1990, revealed that the Cape Technikon offers the following courses to satisfy the statutory requirements, viz.

* NIS I (Stage A)

  Duration. 2 weeks

  Student enrolment. 15 - 30

* NIS II (Stage C)

  Duration. 2,5 weeks

  Student enrolment. 15 - 30

* NIS III (Navigation Control Course)

  Duration. 2 weeks

  Student enrolment. 8 (maximum)

The NIS III, is a pre-requisite for the Command Endorsement and Deck Officer Class 2 examinations as depicted by Table 3-4.

3.3.2 CONCLUSION

Upon closer inspection, it is found that the ENS (Fisherman) course offered by the TCS and the NIS I and II courses offered by the Cape Technikon have distinct differences, as depicted in Table 3-6. However, areas of common ground do exist, e.g. the equipment used. This could be harnessed to make maritime training in Cape Town more cost-effective.

Table 3-6, compares the ENS (Fisherman) and NIS I and II courses in more detail.

Table 3-6 THE ENS (FISHERMAN) AND NIS (I and II) COURSES

SUBJECT	ENS(FISHERMAN)	NIS I AND II
Target group	Fisherman Grades 4 and 3	Deck Officer Class 5, 4 and 3
Class composition	Heterogenous	Homogenous
Education level	Any level plus qualifying service	Matric (Class 3, and preferably Std. 8 for Classes 5 and 4, plus qualifying service
Students per annum	Approximately 120	Approximately 40
Lecturers	Two (Full time)	One (On hire, as required)
Qualifying sea-service	No specification	24 months
Duration	193,5 hours	At least 120 hours for stages A and C or 150 hours for a full time course
Course structure	6 weeks (continuous)	Sandwich - Stages A, B and C.
Modules	RDF, echo sounder, Decca (Mk 21 & 53), Shipmate, Track plotters, Transit/ GPS and Radar.	RDF, echo sounder, Decca (Mk 21), Gyro compass, Loran-C, Omega, Transit/GPS, Radar and ARPA
Navigation Control	Included in course	Excluded (incorporated in the NIS III course
Own ship	One (Controlled from computer)	Four (Each with own set of controls)
ARPA	Two Raytheon (not fitted)	Two (Raypas and Krupp Atlas)
Live radar	Yes. Not suited to track vessel movement because of location	Yes. Ideally located for traffic movement in and out of Table Bay (surveillance)
Computers and Software	BBC & IBM compatible	IBM compatible

Duvenhage (1988:106) states that "the heterogenous composition of the students in the ENS (Fisherman) course is contrary to primary didactic principles, which could adversely affect the training process."

The following opposites are common in the same class group, viz. Std. 1 versus matric, 18 year olds versus 51 year olds, 3 year sea-service (not necessary qualifying sea-service) versus 35 year sea-service. The fact that many of the candidates have several years sea-service does not imply that they are well-versed in the correct operation and interpretation of the electronic navaids on-board their vessels.

In contrast, the students attending the NIS I and II courses offered by the Cape Technikon have, in general, a more homogenous composition with regards to educational/ vocational backgrounds and age. Recently females have entered the merchant navy, a previously all-male arena.

The only similarities are that both centres are utilizing similar equipment, e.g. RDF, echo sounders, Decca, Transit and radar.

Due to the lower academic background of the ENS (Fisherman) course student, the course offered by the TCS is longer in duration to that offered by the Cape Technikon.

The NIS I, II and III course requirements cited in Regulation R.2656 (1985:156-179) are virtually similar to the ENS course offered in the UK throughout.

3.4 THE SOUTH AFRICAN NAVY COURSE

A letter dated October 1990 from Captain J P C van der Westhuizen (Chief of Navy: Vice-Admiral) reveals that the SAN offers the Combat Officer Qualifying (COQ) course to officers aspiring to serve aboard SAN ships. The entrance requirement is matric with a pass in mathematics.

The COQ curriculum (Part 1) and more specifically the module on Navigation Systems (1990:11), elaborates that upon successful completion of the COQ course, the student will be competent in the use of the various navigation systems typical of a SAN ship. Components of the course are Navigation Instrument Systems, Electronic Navigation Systems, Radar Systems as navaid and Propulsion/Steering systems.

3.4.1 NAVIGATION INSTRUMENT SYSTEMS

This section comprises the following modules COQ (1990: 12-16), viz.

* Magnetic compass
* Gyro compass
* Azimuth circle/ring
* Logs
* Echo sounders
* Marine sextant and

* Stuart's distance meter

3.4.2 ELECTRONIC NAVIGATION SYSTEMS

This section comprises the following modules COQ (1990: 16-18), viz.

* Hyperbolic position fixing systems
* Satellite navigation systems
* Automatic waypoint navigation systems
* Specific electronic navaids typical of the SAN

3.4.3 RADAR SYSTEMS AS NAVIGATION AID

This section comprises the following modules COQ (1990: 18,19), viz.

* Principle of radar
* Radar controls and practical setting up
* Main components
* Refraction and attenuation
* False echoes
* Radar navigation

3.4.4 PROPULSION AND STEERING SYSTEMS

This section comprises the following modules COQ (1990:20), viz.

* Factors affecting the manoeuvrability of a vessel

* The effects of wave action (pressure and thrust)

* Forces of heel due to turning

3.4.5 EVALUATION

According to the COQ curriculum (1990:22), an examination covering both the theoretical and practical aspects is conducted, in which the student has to obtain 70% of the total marks allocated.

3.4.6 CONCLUSION

The COQ course offered by the SAN differs from the ENS (Fisherman) course offered by the TCS, in so far that it requires matric with a pass in mathematics as entrance requirement.

The modules offered by both institutions are similar, apart from the sections on Gyro, azimuth circle, marine sextant and Stuart's distance meter which is not included in the ENS (Fisherman) course offered by the TCS.

Gyro, azimuth circle and the marine sextant are included in the seamanship component of the Fisherman Grade Two, Three and Four courses which are externally examined by the SADOT.

3.5 SOUTHAMPTON INSTITUTE OF HIGHER EDUCATION COURSE (UK, DEPARTMENT OF TRADE)

Unlike the RSA, the UK with an extensive seafaring history, has many institutions catering for the need of the seafarer.

A typical example of one of these institutions is the Southampton Institute of Higher Education, previously the College of Nautical Studies (Maritime Studies) with its campus in Warsash, Southampton.

A letter from Captain J S Habberley (Deputy head, Maritime Operations Centre), dated June 1990, discloses that

> "since September 1989, the college became integrated into the Southampton Institute of Higher Education. The maritime provision is provided by the academic Maritime Division and the training of Merchant Navy Officers by the Maritime Operations Centre, e.g. ENS course."

According to Captain Habberley, all institutions in the UK uses as a guideline, the regulations supplied by the Department of Trade in 1981. This document, covers the requirements for training and certification in the operational use of radar and electronic navaids.

The SADOT have adopted the regulations of the UK's Department of Trade virtually verbatim. Only minor changes in the text, where applicable were effected, e.g. RSA text reads "Merchant Shipping Notices" as per Regulation R.2656 (1985:159), as amended, whereas the UK text reads "Department of Trade Merchant Shipping Notices" as per DOT (UK) Regulations and Guide (1981:9).

In general, a great number of maritime syllabi and regulations offered in the UK are adopted by SADOT and local maritime institutions. Possible reasons for this phenomenon could be listed as follows, viz.

* The UK is one of the leading countries with reference to maritime legislation world-wide. It thus makes good sense to adopt their legislation.
* South Africa does not at present have the economic resources to research and implement its own legislation. Issues such as education, health services and housing enjoy higher priority.
* The track record of RSA merchant navy vessels have been reasonably sound, based on the adoption of UK syllabi and regulations. Thus the SADOT, with its severe economic and manpower restraints, in all probability, find this arrangement extremely practical and time saving.
* Being an ex-British colony, the RSA have retained

some of the customs and traditions, especially in maritime circles.

3.6 THE AUSTRALIAN MARITIME COLLEGE COURSES

The Australian Maritime College (AMC) Handbook (1990:11) states that the College is

> "a national, federally-funded tertiary institution, which offers courses in maritime and maritime-related subjects. It occupies two campusses alongside the Tamar River in northern Tasmania, Australia's island State."

The AMC handbook further cites that the main campus (housing the College Administration, Schools of Engineering and Nautical Studies) is situated at Newnham, conveniently close to the Tasmanian State Institute of Technology (TSIT), whose facilities it has access to, and 6 kilometres from Launceston city centre.

In addition, the College's second campus, home of the School of Fisheries, is at Beauty Point, about 50 kilometres north of Launceston near the mouth of the River Tamar. Here practical training in seamanship, navigation and fisheries takes place at the waterfront training centre and on the College vessels.

3.6.1 THE SCHOOL OF FISHERIES

The AMC newsletter, We're making waves (1990:2) illustrates that the School of Fisheries offer the following courses as outlined in table 3-7.

Table 3-7 COURSES AND CAREERS (SCHOOL OF FISHERIES)

	COURSE	DURATION	CAREERS
1.	Bachelor of Applied Science (Fisheries)	3 years	Fisheries biologist, technical officer, seafood technologist, fishing gear technologist, marketing and management positions with government departments & industry
2.	Graduate Diploma in Fisheries	1 year	Fisheries biologist, fisheries research officer, technical advisor, gear technologist, other positions in the catching, processing and marketing secors of the industry and regulatory authorities
3.	Master of Applied Science	2 years	As above
4.	Certificate of Technology in Fisheries Operations	1.5 years (3 semesters)	Fisherman/Skipper
5.	Certificate in Small Craft Operations	6 to 14 weeks	As above

As the Certificate of Technology in Fisheries Operations is the only major qualification leading to the rank of mate or skipper, it will be discussed hereafter.

3.6.2 CERTIFICATE OF TECHNOLOGY IN FISHERIES OPERATIONS

With regards the Certificate of Technology in Fisheries Operations, the AMC Handbook (1990:84) states that

"this course is designed to cover the knowledge requirements for the master of a large fishing vessel (35 metres or greater) operating within the 200 mile fishing zone. Subject to compliance with statutory requirements, exemptions may be obtained from subjects towards the Australian Department of Transport and Communication (DoTC) Certificates of Competency as Master Class 5 (Fishing), Mate Class 4 (Fishing) and Master Class 4 (Fishing)."

3.6.2.1 ADMISSION REQUIREMENTS

The AMC Handbook (1990:84) emphasises that

"year 10 schooling (Standard 8), should normally have been completed although applicants without formal schooling may be accepted, if they satisfactorily complete pre-scribed bridging courses or preliminary work."

3.6.2.2 COURSE STRUCTURE

According to the AMC Handbook (1990:84) the following details with regard to the course structure comes to light, viz.

"that the course is of 3 years duration, of which 44 weeks (3 semesters) is spent at the

College and 130 weeks fishing."

Table 3-8 outlines the content and duration of each of the modules offered.

Table 3-8 COURSE MODULES FOR EACH SEMESTER

YEAR 1 (14 weeks)		YEAR 2 (15 weeks)		YEAR 3 (15 weeks)	
MODULE	HOURS	MODULE	HOURS	MODULE	HOURS
Applied Maths	56	Training Vessel II (Bluefin)	60	Fisheries and Business Management	30
Fisheries Organisation	14	Navigation I	60	Training Vessel III	60
Communication	14	Basic Radar	45	Navigation II	60
Training Vessel I (Bluefin)	60	Radiotelephone	30	Bridge Equipment	15
Marine Safety	42	Seamanship II	60	Meteorology	30
Seamanship I	42	First Aid	20	Seamanship III	60
Fish Handling I	42	Marine Machinery Systems (Fisheries) I	90	Marine Machinery Systems (Fisheries) II	60
Rope & Network	84	Fisheries Ecology	30	Fish Handling II	45
Fishing Technology I	56	Fishing Technology II	60	Fishing Technology III	75
TOTAL	410		455		435

The AMC Handbook (1990:85) states in addition that

"the emphasis in the first year is on deckhands training and on safety at sea. Year 2 involves fishing vessel skipper training, including preparation for the DoTC Master Class 5 (Fishing) examinations. Year 3 provides skipper training for larger vessels and preparation for

the DoTC Master Class 4 (Fishing) examinations. This period includes an intensive period at sea with the vessel Bluefin rigged for various fishing methods."

3.6.3 CONCLUSION

In contrast with the ENS (Fisherman) course offered by the TCS, the AMC does not have a specific course dealing with electronic navaids. However, these modules are included in the Certificate of Technology in Fisheries Operations course (years 2 and 3, viz. Navigation I, Basic Radar, Navigation II and Bridge Equipment).

Although the TCS does have its own training vessel, viz. the mv RSA (non sea-going), emphasis is once more placed on the vital importance and unlimited training capabilities of sea-going training vessels, as illustrated by the AMC.

Cole and Young (Seaviews 1982:15) states, perhaps with acerbity, that

"unless the mv RSA, which leans permanently against the Collier Jetty in Table Bay harbour, Cape Town, offers, e.g. engineer training with a working engine and affords sea time, it surely must have difficulty justifying

continued presence in a harbour suffering shortage of berthing space. Furthermore, as it has no commercial use, it could be of scrap value only."

3.7 THE DANISH MARITIME AUTHORITY COURSES

According to the DMA Handbook (1989:2), "maritime education in Denmark is under the management and control of the DMA which is a government institution under its Ministry of Industry."

The DMA is responsible for the operation of all maritime training institutions and training ships and it:

* appoints teachers to the schools,
* allocates economic resources,
* issues standard timetables for school teaching,
* prescribes syllabi for the individual subjects and
* issues the textbooks to be used.

Furthermore, a board of examiners (independent of the schools) appointed by the DMA prepares examination papers and conducts all examinations.

3.7.1 EDUCATION OF FISHERMEN IN DENMARK

The DMA Handbook (1989:5) further states that "education

of fisherman in Denmark for the Skipper's Certificate, is part of the maritime education scheme."

The training for the fisherman's examination certificate is grouped into three phases viz.

* Pre-sea training (not compulsory)
* Sea-going service and
* Skipper school

The DMA handbook further elaborates that pre-sea training is given to young men and women, usually between 16 and 20 years of age, who are physically fit and have gone to school for at least 9 years (Std. 7).

The basic training period of 5 weeks includes lifeboat drills, safety at sea, fire fighting, basic seamanship, basic marine technology, basic first aid, hygiene and watchkeeping duties.

Sea-going service must be on board fishing vessels of 15 tons or more for 24 months. Alternatively sea-going service may be obtained as an ordinary seaman or ship's assistant (alternating service in the deck and engine departments) on board merchant navy ships, navy ships and fishing vessels for a total of 24 months. At least 12 months of this type of sea-service must be on fishing vessels. In this case all the ships served on must be of

20 tons or more.

After the qualifying sea-service, the DMA Handbook (1989: 4) declares that

> "the candidate will attend a skipper school for 6 months. Upon completion and having successfully passed the examinations and sight tests, the candidates acquire a certificate of competency as Skipper, 3rd Class. This certificate entitles the holder to be skipper on fishing vessels of less than 500 tons in limited waters.
>
> After a further 12 months sea-service holding a Skipper, 3rd Class certificate and a further 5 months at a skipper school, the candidates will upon successful completion of the course and examinations obtain a certificate of competency as Skipper, 1st Class. This certificate entitles the holder to be skipper of fishing vessels of less than 500 tons in unlimited waters."

The DMA concludes that in the case of fishing vessels of 500 tons or more certification requirements are decided in each case by the Danish Administration.

3.7.2 ELECTRONIC NAVIGATION SYSTEMS TRAINING

As in the case of AMC, the DMA Handbook (1989:7) notes that Denmark too has its own sea-going training vessel, viz. the mv Danmark

> "which is utilised for training in practical navigation, electronic navaids, watchkeeping procedures and passage planning. It is specially built for the purpose of training fishermen and is thus equipped with various fishing gear. It accommodates 20 trainees and has a crew of 9."

The DMA Handbook cites that instrumentation on the bridge includes the following, viz.

* a control board for hydraulic fishing gear,
* different radars of conventional type and 1 ARPA-radar with colour display,
* different types of Decca navigators,
* echographs and echoscopes for fishfinding of different types,
* electromagnetic log,
* gyro and magnetic compasses,
* medium, high and very high frequency radio-telephones,
* radio telex
* RDF,

* satellite navigators,
* sonar equipment and a
* video plotter connected to the
  Decca navigator.

According to the DMA Handbook (1989:7), students participate in two cruises (each of two weeks duration). One cruise during the preparation for the Skipper, 3rd Class examination and the other for the Skipper, 1st Class examination.

The DMA Handbook states that the primary purpose of the first cruise is to train the students in watch-keeping procedures and in the use of navigation and fishfinding instruments and equipment. They are also trained in position determination by terrestrial observations. At the termination of the cruise the students must pass an examination in the use of navigational and fish finding equipment. In addition, they must have conducted bridge watch-keeping in a satisfactory manner.

It continues that during the second cruise the students are further trained in watch-keeping procedures and in voyage planning. On the basis of theoretical class-room reading of principles of electronic navigational aids, they are now further trained in their proper use and in the interpretation of information obtained from this

equipment. Training in radar observations are carried out. Further exercises in different fishery methods and ship handling during fishing operations are conducted.

Finally, at the termination of the cruise the students must pass examinations in radar observation and plotting and in the use of navigational instruments. Additionally, they must again have conducted bridge watchkeeping in a satisfactory manner.

3.7.3 CONCLUSION

Unlike the ENS courses offered by the TCS, the Danish system includes these courses in the 3rd and 1st Class skipper certificates of competency syllabi.

For a period of two weeks, students undergo practical training aboard a specially designed training vessel cruising in Danish waters.

The only tuition ashore is a short introduction on the principles of operation of the various electronic navaids at the skipper school, prior to the first cruise.

3.8 HOCHSCULE BREMEN COURSES (GERMANY)

In a letter dated June 1990 from Professor Captain C

Marcus (Head of Department: Nautical Studies - Bremen Polytechnic), it is noted that

> "the Bremen Polytechnic is incorporated into the Hochschule Bremen (University of Bremen). The Department of Nautical Studies is responsible for courses in Technical Navigation, the TCS equivalent of ENS."

According to Professor Captain Marcus, Electronic Navigation is the major part of the syllabus for Technical Navigation in the studies for the Master Licences (Master foreign-going: 6 semesters, Master medium-trade: 4 semesters and Master near continental trade: 3 semesters).

He continues that the course content for the Master foreign-going (polytechnic level) studies is also used for the lower qualifications (Master medium-trade and Master near continental trade), but with less depth and without the scientific approach (as in the case of Master foreign-going).

Furthermore, Technical Navigation comprises 150 lecture hours of the subject Navigation (total 370 lecture hours), i.e. about 40% of the subject Navigation. It is offered in the 5th and 6th semesters with 4 lecture hours per week.

The syllabus for Technical Navigation encompasses the following contents, viz.

* Compass installations: Magnetic and Gyro compass systems and sub-systems (repeater, auto-pilot and integrated navigation systems).
* Radio direction finder: Emphasis on their use in distress situations, less for navigational purposes.
* Radar equipment: Radar theory and characteristics. Radar as navigation aid and as anti-collision aid. ARPA characteristics. Emphasis on the correct interpretation of the radar picture and displayed data, less on technical details.
* Hyperbolic navigation systems: Decca, Loran-C and Omega.
* Other navaids: Transit, GPS, Echo sounder, logs and electronic sea-charts.

Professor Captain Marcus summarises that for all the items mentioned, the Department of Nautical Studies aims for the understanding of systems' theory. Here special emphasis is laid upon the correct use and the critical assessment of their reliability and accuracy which is to be achieved in practical use on-board. Less lecture time

is devoted to theoretical accuracy and technical characteristics.

3.8.1 CONCLUSION

The course covering ENS offered by the Hochscule Bremen differs from that offered by the TCS in so far that the target group is different, i.e. it is offered to Master foreign-going, Master medium-trade and Master near continental trade.

The TCS however, only caters for ENS training of skippers and mates within the RSA fishing industry.

In the case of the TCS, the ENS (Fisherman) course does not form part of the certificate of competency preparation courses, i.e. Fisherman Grades Two, Three and Four, as in the case of Technical Navigation forming part of the Master licences.

The ENS (Fisherman) course is a separate ancillary course which is required, in order to become eligible, for the Fisherman Grade 3 examination as outlined in table 3-3.

Another difference is that the ENS (Fisherman) course offered by the TCS is a six week course of 193,5 hours duration, whereas Technical Navigation is only offered

for 4 hours a week in semesters 5 and 6, a total of 150 lecture hours.

Apart from the items on Compass installations, Loran-C, Omega, logs and ARPA, the remaining items in the syllabus for Technical Navigation are similar to those of the ENS course offered by the TCS.

3.9 US MERCHANT MARINE ACADEMY COURSES, USA (US DEPARTMENT OF TRANSPORTATION)

A letter dated June 1990, from Captain R Stewart (Head: Department of Marine Transportation) reveals that the

> "United States Merchant Marine Academy (USMMA) is situated at Kings Point, New York, USA.
>
> Under the auspices of the Department of Marine Transportation, Division of Nautical Science, the following electronic navigation courses are presented to Midshipmen, viz. Applied Marine Electronics IV (D-464), Marine Electronics - ARPA (D-4) and Applied Marine Electronics I (D-251)."

A brief summary of each of these electronic navigation systems courses offered by the USMMA follow in tables

3-9, 3-10 and 3-11 according to the USMMA Course Outline (1986:1-7).

Table 3-9 APPLIED MARINE ELECTRONICS IV (D-464)

Duration of course	10 weeks of the first or second quarter
Target group	Midshipmen in their first class year
Number of hours weekly	2 class hours 2 laboratory hours
Course content	Relative motion triangle, Radar block diagram, propagation, refraction, ducting, radar beam, factors affecting range, bearing accuracy, display tubes, operating controls, radar scope interpretation, undesirable effects, radar navigation, Rules of the Road, ARPA and practical plotting
Tests	2 x Theory and 1 x Practical plotting

Captain Stewart states that upon successful completion, the Midshipman is awarded a Radar Observers Certificate.

This certificate is required for the United States Coast Guard (USCG) license and is, in addition, a graduation requirement.

Table 3-10 APPLIED MARINE ELECTRONICS - ARPA (D-4)

Duration of course	10 weeks of the third or fourth quarter
Target group	Midshipmen in their first class year
Number of hours weekly	2 class hours 2 laboratory hours
Course content	IMO Performance Standards, anti-collision loop, types of ARPA, Collision Avoidance System (CAS) video instruction, target swop and rate-aiding, error sources, tests, warnings, alarms, Colregs, collision points and Predicted Areas of Danger (PADS), trial manoeuvres, history dots/past positions, operational scenarios, analysis of collected data, major comparisons of equipment, personal utilization observations, barriers and exclusion zones.
Tests/mark allocation	Midterm test - 30% Laboratory tests - 30% Final tests- 30% Class participation - 10% Total- 100%

Table 3-11 APPLIED MARINE ELECTRONICS I (D-251)

Duration of Course	10 weeks of the first, second or fourth quarters
Target group	Midshipmen in their second or third class year
Number of hours weekly	2 class hours 2 laboratory hours
Course content	Basic radio language and parameters, radio frequency spectrum, modulation (Amplitude, Frequency and Pulse Modulation), transmitters, receivers, VHF & Single Side Band (SSB) operation, Communication procedures (distress, urgency & security), Satellite communication (Satcom), RDF, Auto Direction Finder (ADF), depthfinding, speed logs, lifeboat radio/auto-alarm, hyperbolic geometry, Loran-C, rapid radar plotting and collision avoidance (on radar simulator)

3.9.1 CONCLUSION

The ENS (Fisherman) course offered by the TCS differs from the courses presented by the USMMA. The differences are outlined in Table 3-12.

Table 3-12 THE ENS COURSES OF THE TCS AND USMMA

SUBJECT	USMMA	TCS
Course structure	Three separate courses. Each of 10 weeks duration	A single course of 6 weeks duration
Duration in hours	3 courses Each of 40 hours duration Total:120 hours	193,5 hours
Target group	Midshipmen in their first and second/third class year	Fishermen, wishing to sit the Fisherman, Grade 3 examination
Certificate issued	Radar Observers Certificate	ENS (Fisherman)

The course content offered by both institutions are largely similar, apart from the sections on ARPA, Satcom, lifeboat radio, VHF/SSB and communication procedures offered by the USMMA.

ARPA is not offered by the TCS. According to Bole & Jones (1981:88) citing Regulation 12 of the IMO Safety of Navigation Regulations, as amended, it is not a statutory requirement for vessels of less than 15 000 gross regis-

tered tonnes to be fitted with an ARPA.

In general, the tonnage of fishing vessels registered in RSA ranges between 20 grt and 1 600 grt. The sections on Satcom, lifeboat radio, VHF/SSB and communication procedures forms part of the Restricted Radio Telephone (Marine) course (of two weeks duration) offered by the TCS.

3.10 SUMMARY

This chapter focussed on the ENS (Fisherman) course offered by the TCS and how it compares with similar courses offered by the following institutions in the RSA and abroad, viz. Cape Technikon, SAN, AMC (Australia), DMA (Denmark), Hochscule Bremen (Germany), Southampton Institute of Higher Education (UK) and the USMMA (USA).

The ENS (Fisherman) course offered by the TCS is unique in so far that it is a dedicated course offered to fishermen only.

It must be borne in mind, that the formation of the two separate institutions serving mariners in the RSA , viz. TCS and Cape Technikon (both situated in Cape Town), evolved during the infamous apartheid era of the RSA. The course modules, instrumentation and objectives of both

institutions are similar (only the target group differs).

After the overwhelming "yes" vote in a local, whites only, referendum held on 17 March 1992, in favour of reform (for an apartheid free RSA via negotiation), the services and expertise of both institutions will have to be incorporated as one. The continuation of such duplication of maritime training in the RSA, is a luxury which simply cannot be afforded.

The ENS (Fishermen) course modules are largely similar in comparison to those offered by similar institutions both locally and abroad.

The course structure and duration differs, as a result of the differing target groups. The overwhelming majority of fisherman in the RSA come from the disenfranchised black and coloured communities having, in general, a poor academic background largely due to the apartheid system.

To accommodate these students without lowering internationally accepted standards, the TCS had to increase the duration of the ENS (Fisherman) course which is presently of six weeks duration. This measure is, at times, frowned upon by shipowners. They allege that an increase in the course duration, reduces their training budget.

The next chapter will examine the teaching and technical qualifications, as well as the teaching and industrial experience of the ENS (Fisherman) course lecturer.

CHAPTER FOUR: PROFILE OF THE ELECTRONIC NAVIGATION SYSTEMS (FISHERMAN) COURSE LECTURER

CHAPTER FOUR

LIST OF TABLES

CHAPTER FOUR

PROFILE OF THE ELECTRONIC NAVIGATION SYSTEMS (FISHERMAN) COURSE LECTURER

4.1 INTRODUCTION

Unlike their counterparts in education, i.e. those persons teaching at schools, colleges of education, technikons and universities, the person lecturing at a maritime college in the RSA has to follow a different route before becoming a part of the educational fraternity.

Conventionally, potential primary or secondary school teachers may after matriculation enrol at a college of education, technikon or university, provided that he/she has the particular entry qualifications. Upon successful completion of a continuous three/four year term in education related subjects, interspersed with short periods of actual teaching experience, the newly qualified teacher may enter the teaching fraternity.

The route followed by a lecturer in maritime studies is markedly different. After successfully completing a matric with passes in Mathematics and Physical Science, the potential lecturer in maritime studies is recruited

into the ranks of the merchant navy, viz. De Beers Marine, Pentow, Portnet, Safmarine and Unicorn Shipping Lines. Here a four year cadetship (minimum sea-service required being 24 months) is served on various types of vessels, e.g. cellular container carriers, bulk carriers, refrigerated vessels, product tankers and roll-on, roll-off (ro-ro) vessels.

During the four year cadetship, a year is devoted to study at a Technikon in which the T2 - Maritime Studies and later the SADOT Deck Officer Class 3 Certificate of Competency qualification is obtained.

After acquiring a further 42 months sea-service and completing both the Technikon T3 - Maritime Studies (SADOT Deck Officer Class 2 Certificate of Competency) and T4 - Maritime Studies (SADOT: Deck Officer Class 1 Certificate of Competency, Master Mariner) qualifications, the potential lecturer could join one of the following tertiary maritime institutions in the RSA, viz. Natal Technikon (Durban), Cape Technikon or the TCS in Cape Town.

The TCS caters mainly for post-school education, viz. Fisherman Grade 4, 3, 2, 1 and the Deck Officer Class 6, 5 and 4 Certificates of Competency, i.e. up to M + 2.

Due to the acute shortage of Deck Officer Class 1 applicants for vacant posts at the TCS, this institution was forced to employ lecturers holding a Deck Officer Class 2 or 3 qualification. This scenario is acceptable, as these applicants hold a higher qualification than the target group they will be lecturing.

Arising from informal discussions with ex-colleagues (holders of the Deck Officer Class 1 qualification) still in a sea-going capacity, the main reason cited for not accepting a lecturing post at the TCS, is the poor remuneration package offered.

Holders of a Deck Officer Class 1 qualification earn a considerable amount more, in a sea-going capacity, than they would as a lecturer commencing in post-level 1 with no formal teaching qualification at the TCS.

It appears to be a well accepted practice at autonomous institutions such as technikons, unlike the TCS, that special remuneration packages are negotiated to attract applicants with the best qualification and experience, despite the fact that they are not in possession of a formal teaching qualification.

To date, no formal teaching qualification or experience is required prior to joining any of the three above

mentioned maritime institutions. How they eventually obtain a formal teaching qualification, will be addressed in section 4.3.

The training, qualifications and industrial experience gained by these lecturers in maritime studies, is discussed hereafter.

4.2 TRAINING, QUALIFICATIONS AND INDUSTRIAL EXPERIENCE

Lecturers for the ENS courses at maritime colleges are recruited from the local merchant navy.

According to Safmarine, the largest merchant shipowner in South Africa, the following entrance requirements must be satisfied by aspiring Navigating/Deck Cadet Officers, viz.

* A Matriculation or Senior Certificate - the subjects passed must include Mathematics and Physical Science with a minimum of a 'D' symbol on the Standard Grade or an 'E' symbol on the Higher Grade. A pass in English and Afrikaans at matric level is also essential.
* Entrants must not be older than 21 years of age on 1 January of the year in which training commences.
* Non-South African citizens must have permanent residence in the Republic.

In order to qualify for Deck Officer training, the candidate must in addition pass the very stringent sight and colour vision tests conducted by the SADOT (Marine division). If unsuccessful, the candidate may still pursue a career in the merchant navy as an Engineering Cadet Officer, trainee Radio Officer or in the catering department, which eventually leads to the rank of Purser.

For the successful candidate, training is divided into the following stages according to Safmarine, viz.

Phase 1: A period of approximately 12 months at sea devoted to practical experience and familiarisation with the ship, its parts, operation and routine.

Phase 2: Six months (semester) at the Natal or Cape Technikon's Department of Maritime Studies (General Botha campus) engaged in full time study, at the end of which the cadet writes the Technikon T1 examinations in Maritime Studies.

Phase 3: A further 12 months at sea in which more time is devoted to understudying the watchkeeping officers in their various duties. Upon comple-completion of the required sea service, another semester is spent at the Technikon's Department of Maritime Studies engaged in full time study toward the Technikon T2 examinations in Maritime

Studies.

If successful, the Technikon T2 (Maritime Studies) and Deck Officer Class 3 qualification obtained, entitles the student to sail as Third Navigating Officer aboard a foreign-going vessel.

After 18 months sea service as watchkeeping officer whilst holding a Technikon T2 (Maritime Studies) and Deck Officer Class 3 qualification, the candidate completes a semester at the Cape Technikon engaged in full time study toward the Technikon T3 (ND - Maritime Studies) and Deck Officer Class 2 qualification. This qualification entitles the holder to sail as Second Navigating Officer aboard a foreign-going ship or as Master of a vessel where short-sea restriction applies, i.e. covering an area of not more than 500 nautical miles in length and extending 250 nautical miles from the shore between the limits of Punta Do Oro and the mouth of the Kunene River as per Regulation R.2652 (1985:02).

The Technikon T4 (NHD - Maritime Studies) and Deck Officer Class 1 (Master Mariner) qualification is obtained after an additional 24 months sea service followed by a semester at the Cape Technikon. This qualification entitles the holder to sail as Chief Navigating Officer aboard a foreign-going vessel. During this phase (6 - 12

years), the Master is understudied. It culminates in a command aboard a foreign-going vessel.

Upon successful completion of the Technikon T4 and Deck Officer Class 1 (Master Mariner) qualification, the aspiring Chief Officer, now approximately 28 years of age, is faced with the following options, viz.

* Remain in a sea-going capacity for the next 8 to 12 years understudying the Master, with a view of ultimately taking command of a foreign-going vessel.
* Terminate a sea-going career of approximately 10 years and seek marine related employment ashore.

Table 4-1 outlines the rank structure (read from bottom) of the Deck/Navigating department in the merchant navy.

Table 4-1 DECK/NAVIGATING DEPARTMENT - RANK STRUCTURE

RANK	QUALIFICATION REQUIRED	SEA SERVICE
Master (Captain)	Class 1 Deck Officer (Master Mariner) & NHD - Maritime Studies	+/- 30 years to retirement
Chief Navigating Officer	Class 1 Deck Officer (Master Mariner) & NHD - Maritime Studies	8/12 years
Second Navigating Officer	Class 2 Deck Officer & ND - Maritime Studies	24 months (2 years)
Third Navigating Officer	Class 3 Deck Officer & Technikon T2 qualification in Maritime Studies	18 months (1,5 years)
Navigating Cadet	Technikon T1 qualification in	24 months

In the South African context, it is evident that those lecturers associated with ENS (Fisherman) courses have opted to terminate their sea-going career in order to pursue one in education.

4.3 TEACHING QUALIFICATIONS, TEACHING EXPERIENCE AND OTHER SUBJECTS

Traditionally, a newly recruited lecturer in maritime education have no formal teaching experience or qualification prior to joining a maritime institution.

A formal teaching qualification, viz. a National Higher Diploma in Post School Education (NHD-PSE), can be obtained at a technikon on a full-time basis (one year), part-time basis (two years) or by tele-tuition, e.g. Technikon RSA.

According to the Department of National Education's (DNE) Report, NATED 02-151, on Formal Technical Instructional Programmes in the RSA (1991), the subjects forming part of the NHD-PSE course are as indicated, viz.

* Afrikaans
* Educational Technology: Post School Education
* Empirical Education at Post School level
* English
* Fundamental Andragogics

* First Aid and Occupational Safety
* Management
* Post School Didactics
* Post School Education: Historical Perspective
* Research Methods and Techniques
* Specific Subject Didactics
* Teaching Practice/Language Competency Test (English and Afrikaans)

Obtaining a formal teaching qualification in this manner is a slow process, as only a limited number of lecturers can be released annually to attend the NHD-PSE course, i.e. either on a full-time basis, part-time basis or by tele-tuition.

Absence from their institution, during final examinations (NHD-PSE), could cause serious disruptions if a large number of lecturers were released to attend the course.

An investigation indicated that approximately half the total compliment at both the TCS and Cape Technikon's Department of Maritime Studies hold a formal teaching qualification. This situation will however remedy itself as time passes. Lecturers are currently being released, on a structured basis, to complete this qualification.

Since the inception of the ENS Laboratory at the TCS in

January 1981 to date, eight lecturers were associated with the ENS (Fisherman) course. Four have resigned to pursue a career elsewhere. There are currently two lecturers in the ENS (Fisherman) department, the remaining two occupying administrative posts.

In various interviews with the ENS (Fisherman) course lecturers, the data depicted in Table 4-2 were obtained with regards their qualifications and experience.

Table 4-2 OVERVIEW OF THE ENS (FISHERMAN) COURSE LECTURERS (1992)

NO	AGE	QUALIFICATION		EXPERIENCE	
		MARITIME	TEACHING	INDUSTRIAL	TEACHING
*1	57	Master Mariner	Nil	15 years	16 years
*2	43	Master Mariner	Nil	11 years	6 years
*3	37	Master Mariner	NHD-PSE	10 years	10 years
4	37	Master Mariner	NHD-PSE	10 years	9 years
*5	34	Chief Navigating Officer (Foreign)	NHD-PSE	8 years	7 years
6	34	NHD - Maritime Studies	NHD-PSE	8 years	7 years
7	51	Master Mariner	NHD-PSE	26 years	6 years
8	34	Class 2 - Deck Officer	Nil	8 years	4 years

(* resigned from TCS)

NOTE: The Master Mariner qualification obtained by lecturers 1 to 4 form part of the old syllabus in force prior to the International STCW Convention, 1978.

Government Regulation R.2652 29 November 1985, outlines the qualifications necessary to conform with the STCW Convention of 1978, e.g. Master Mariner (Foreign) under old syllabus, now the Deck Officer Class 1 (Master Mariner) Certificate of Competency. For greater detail, refer to table 3-5, Table of Equivalent Certificates.

Table 4-2 indicates the following data about the ENS (Fisherman) course lecturer, viz.

* Average age: 40,875 years
* Maritime Qualification: 75% hold a NHD - Maritime Studies/ Master Mariner Certificate of Competency (M + 4) and 25% a Chief Navigating Officer (Foreign)/ Deck Officer Class 2 Certificate of Competency (M + 3)
* Teaching qualification: 62,5% hold a NHD-PSE and 37,5% hold no teaching qualification whatsoever
* Average industrial experience: 12 years
* Average teaching experience: 8,125 years.

The researcher is of the opinion, based on his own involvement with ENS (Fisherman) training, that ideally all ENS (Fisherman) course lecturers should have a M + 4

maritime qualification, i.e. Deck Officer Class 1 (Master Mariner) and/or the NHD - Maritime Studies, together with a minimum of 5,5 years qualifying sea-service aboard vessels with the latest electronic navigation technology.

In addition, the ideal ENS (Fisherman) course lecturer should have a formal teaching qualification prior to joining the institution. This is a problem which will in all probability never be overcome, as it implies attending a technikon for at least 1 year full-time study at own expense, without income and without the security that a post will be vacant upon successful completion thereof.

Indications are that an abnormally high lecturer turn-over exists within the ENS (Fisherman) department of the TCS, viz. 4 lecturers resigned between 1981 and 1992 (1 lecturer every 3 years). This could be attributed to a host of variables, among them being remuneration (in general, salaries offered elsewhere in the maritime industry are higher than those offered by the maritime institutions), job satisfaction and personal differences.

Of late, greater versatality was required within the ranks of the TCS and as a result the ENS (Fisherman) course lecturers were also involved in teaching subjects such as Business and Law, Collision Regulations,

Meteorology, Proficiency in Survival Craft, Orals, and Signals for the Fisherman Grades, Deck Officer Class 6, 5, 4 and Command Endorsement candidates.

Apart from their normal teaching duties, the ENS (Fisherman) course lecturers are also involved in the following extra-mural courses, viz.

* ENS satellite courses at the small fishing centres in the RSA, e.g. Port Nolloth, Lamberts Bay, Gans Bay, etc.
* ENS - National Sea Rescue Institute (NSRI)
* Under 25 Tonne Skippers' course for small boat owners

4.4 INTERESTS

Various unstructured interviews held with the above-mentioned ENS (Fisherman) course lecturers, reveal that their interests vary from outdoor activities (fishing and game-hunting) to sport (sailing, cycling, tennis, squash and swimming) and computers.

As they are now no longer sea-faring, they keep track of rapid developments in the maritime world by reading nautical publications and journals. In this regard the Society of Master Mariners (South Africa) serve as a vital link on specific developments, both on the national

and international fronts, affecting the South African mariner.

Three of the above-mentioned ENS (Fisherman) course lecturers are still actively engaged in further study, not only to enhance their existing qualifications, but also to assist in understanding and ultimately solving the various problems experienced by their students.

Two are undertaking research programmes in Post-school education and the other studying towards a Bachelor of Arts (BA) degree.

4.5 SUMMARY

It is noted that on average, the ENS (Fisherman) course lecturer is 40 years of age, has had 12 years industrial and 8 years teaching experience.

The minimum maritime qualification obtained is M + 3. More than half of the lecturers hold a formal teaching qualification (NHD-PSE) obtained on a part-time basis.

Whether intrinsically or extrinsically motivated, indications are that they are in a process of furthering their existing qualifications in order to facilitate the effective transfer of knowledge.

In the following chapter, the opinions of the South African shipowner and that of the SADOT will be summoned with reference to the ENS (Fisherman) course.

CHAPTER FIVE: THE OPINIONS OF THE SOUTH AFRICAN SHIPOWNER AND DEPARTMENT OF TRANSPORT, SHIPPING DIRECTORATE, MARINE DIVISION

CHAPTER FIVE

THE OPINIONS OF THE SOUTH AFRICAN SHIPOWNER AND DEPARTMENT OF TRANSPORT, SHIPPING DIRECTORATE, MARINE DIVISION

5.1 INTRODUCTION

Often educationists and shipowners point the fingers of blame at each other when it involves student failure or poor performance. This is a highly controversial subject, especially with present day economic constraints.

Acceptedly, there are many variables that could possibly influence student performance, e.g. preparatory practical training at sea, formal tuition at the colleges, the student's mental and physical preparedness, to mention a few.

In chapters three and four, reference have been made to the ENS (Fisherman) course structure and the ENS (Fisherman) course lecturer respectively.

The objective of this chapter is thus to allow the South African shipowner and SADOT the opportunity to voice their opinions with regard to the ENS (Fisherman) course and the possible problems encountered by the students.

Due to the sensitivity and personal nature of the subject-matter, the researcher utilised structured interviews to collate the necessary data.

Within the fishing industry the opinions of two of the major fishing conglomerates in the RSA and largest supporters of the ENS (Fisherman) course, viz. Irvin and Johnson (I & J) Ltd and Sea Harvest Corp (Pty) Ltd, were sought.

5.2 IRVIN AND JOHNSON LIMITED

I & J is one of South Africa's leading fishing companies with their Trawling Division based in Table Bay harbour, Cape Town.

The interview with Captain G Clack, Marine Superintendent Development (Trawling division), verified the suspicion that the recruitment of suitable able-bodies to serve within the fishing industry can indeed become a complex task.

5.2.1 RECRUITMENT OF SEAFARING PERSONNEL

There are many possible variables influencing a prospective candidate to pursue a career at sea, viz.

* a personal affection for the sea

* previous family involvement
* curiosity for the unknown
* misconceptions about the tranquil, placid seas
* and the most influencial being the high rate of unemployment existing in South Africa today. Ever increasingly more and more matriculants are finding themselves unemployed.

NB: This is not an exhaustive list.

After the matriculation examinations, I & J places advertisements for deck and engineering cadets within the fishing industry in the local printed media.

The response has always been overwhelming, but unfortunately they can only accommodate 15 candidates per annum.

A weeding process is then initiated which involves the following, viz.

* prospective candidates must have obtained a good pass in both Mathematics and Physical Science
* they should pass a standard eyesight test which involves both colour and vision (as they will eventually serve as watchkeeping officers)
* they should pass a psychometric test and
* a medical examination.

5.2.2 I & J TRAINING SCHEME

The successful applicants are then sent to sea to ascertain whether they can adapt to their new environment. This is the phase where, previously, the highest dropout rate occurred.

Ironically, the dropout rate for the 1992 deck cadet intake has been minimal, in all probability, due to the growing awareness, among applicants, of the high levels of unemployment existing ashore.

During their period aboard these aspiring young deck officers, who will eventually assume the role of skipper, are given various projects of a practical nature to be completed under the guidance of the skipper and his complement.

A record is kept of their progress, which is monitored by Captain Clack and his shore-based team. Upon reaching the necessary levels of competence, they are then sent to college to complete various ancillary courses which include the ENS (Fisherman) course (Refer to Table 3-3 in Chapter 3).

Upon successful completion of their ancillary courses and gaining the required qualifying sea service, these

candidates sit for the Fisherman Grade 4 (Internal) and SADOT Fisherman Grade 3 and 2 certificate of competency examinations.

Mention should also be made of the fact that deckhands, with a strong potential to become a deck officer and eventually skipper, are trained and upgraded to satisfy the need as it arises.

5.2.3 PROBLEMS WITH REGARD TO THE ENS (FISHERMAN) COURSE

The TCS is continuously collaborating with industry to ensure that courses offered are market related.

During the course of 1991, I & J approached the TCS and requested that all courses should be offered with a competency based approach.

After numerous deliberations, the TCS accepted the request made by I & J. With a view of implementing this type of tuition into existing course structures, 12 staff members of the TCS were sent to complete a Competency Based Maritime Training (CBMT) course (15 to 19 June 1992). Modules for both lecturers and students are presently being drafted by the lecturers of the TCS.

The ENS (Fisherman) course lecturers were exempted from

attending this CBMT course, as the ENS (Fisherman) course in its present form is largely competency based.

Captain Clack is of the opinion that while the radar simulator of the TCS utilised for the ENS (Fisherman) course suffices as a plotting trainer, it is totally inadequate for the use of bridge team management.

He is also critical about the radar simulator and its appurtenances being antiquated and not adequately preparing the student to cope with real-life situations commonly encountered at sea, e.g. multi-target encounters. The radar simulator has only one, non-interactive, own ship.

This shortcoming may have contributed to a recent casualty involving a collision between an outgoing I & J trawler and the breakwater in restricted visibility.

There is thus a dire need for a Navigation Control (Fisherman) course, which will include bridge team management on a multi-own ship simulator, i.e. at least three interacting own ship positions. The course should be targeted at senior personnel, prior to assuming a command on a fishing vessel of greater than 100 gross registered tonnes. Its design could include, as per Regulation R.2656 (1985:173):

* the use and operation of the full range of navigation equipment, including but not limited to radar, echo sounder, Decca/GPS, RDF and Track Plotters studied during the ENS (Fisherman) course and
* the principles of keeping a safe navigation watch, chartwork, passage planning and radar plotting.

In an attempt to address the problem Captain Clack has, with the assistance of the Cape Technikon's Department of Maritime Studies, initiated a Bridge Management Course in order to alleviate the defined problem.

From this course various other shortcomings were identified, among them being basic shiphandling in confined waters, e.g. berthing, unberthing and general manoeuvring.

To supplement the experience gained on the simulator, Captain Clack hired the services of the non-commissioned harbour tug, Alwyn Vincent (now used for pleasure cruises), to enable the students to gain additional hands-on experience in basic shiphandling.

The entire venture thusfar have been highly efficacious, albeit costly.

In reference to section 2.4 in Chapter 2, the vital role of

* a national sea-going training vessel or
* revitalised bridge simulator equipment, to replace that in current use,

utilised for upgrading the quality of our (RSA) maritime personnel, must once again be accentuated.

This would assist in enabling seafarers to meet the demanding requirements of the modern, highly sophisticated fishing vessels in which they presently serve.

5.3 SEA HARVEST CORPORATION (PTY) LIMITED

According to the brochure Careers at sea, (1992:8) distributed by the Maritime Industry Training Board (MITB), "Sea Harvest controls one of South Africa's largest fishing fleets" operating out of Saldanha Bay, situated on the South African west coast.

5.3.1 RECRUITMENT OF SEAFARING PERSONNEL

An interview with Mr G Bowers of the Fleet Training - Development Department of Sea Harvest, revealed that the educational requirements of applicants are dependant on the position sought, e.g. ratings must have passed

Standard 6, while a cadet should have passed the matriculation examination. Subjects to include Mathematics and Physical Science with a minimum 'E' symbol.

In addition, the applicants should preferably be male, aged 16 or older and certified fit for sea duty, i.e. they should pass the SADOT standard eyesight test and medical examination.

After passing a personal interview and being declared fit for sea duty, the candidate joins a vessel for one or two voyages to ascertain whether they have in fact made the correct career choice.

The personnel department recruits approximately 30 applicants per annum. The dropout rate, after the voyage to sea, is low due to the fact that recruits have been exposed to their working environment at earliest opportunity.

Among the additional qualities the company seeks are initiative, leadership, reliability and a sense of responsibility.

5.3.2 SEA HARVEST TRAINING SCHEME

Mr Bowers emphasises that full training is given in a

variety of disciplines with the objective of equipping employees, at any level, for a successful career at sea. The training given ensures that both the SADOT and company requirements are satisfied.

Besides the demanding personnel function, Mr Bowers now also assumes the role of tutor in courses, s.a. Fisherman Grades 4, 3 and 2 previously offered by the TCS, in a bid to minimise training costs.

Earlier, students either

* travelled to Cape Town to attend courses offered by the TCS which was not only costly, but suitable accommodation was not always readily available or
* lecturers of the TCS travelled to Saldanha Bay. The travelling and subsistance costs of the lecturer were previously borne by the state, but has now been passed on to the shipowner, increasing the training cost.

This in-house system of training has proven extremely successful as it is competency based and not time based as was previously the case when courses were offered by the TCS. Many of his students have subsequently obtained the coveted SADOT certificate of competency.

Mr Bowers is currently engaged in a major educational program with regard to on-board training and exposure to bridge equipment, bearing in mind that skippers were previously apprehensive about cadets and junior officers utilising bridge equipment. He has introduced a record book system in which the trainee must perform various tasks under the watchful eye of the skipper or senior officer. This record book is continually scrutinised by himself to ascertain the levels of competency reached by the trainees during their term at sea. He further alleges that most skippers work their crews extremely hard for greater financial gain. This implies that in these cases prospective mates and skippers do not get the necessary exposure to bridge equipment.

When the necessary levels of competence and qualifying sea-service are attained, trainees are sent to complete the various ancillary courses, e.g. ENS (Fisherman) course, as is depicted in Table 3-3 of Chapter 3.

5.3.3 PROBLEMS WITH REGARD TO THE ENS (FISHERMAN) COURSE

During the interview, Mr Bowers strongly expressed his dissatisfaction with the current ENS (Fisherman) course structure. He indicated that, perhaps, too much emphasis is placed on theoretical aspects and too little on practical aspects.

He is in complete support of the concept of CBMT and believes that students should progress at their own pace, provided that full competence is the end result.

In conclusion, Mr Bowers is of the opinion that the present simulator equipment utilised for the ENS (Fisherman) course is adequate. Should the necessary funds, approximately 5 to 12 million rands, for an upgraded radar simulator be raised this would definitely enhance the existing training facility.

5.4 THE OPINION OF THE SADOT

The SADOT is a government institution under the auspices of the Ministry of Transport.

It is independent of the maritime training institutions, s.a. TCS, which fall under the Ministry of National Education (NATED).

Apart from functions ranging from the safety of shipping (surveying) to the preservation of the RSA's marine environment (combating marine pollution), the SADOT is also responsible for

* prescribing syllabi for individual marine related subjects

* preparing examination papers and
* conducting examinations for certificates of competency.

The framework of maritime education and training in the RSA is provided by the MSA (Act 57 of 1951, as amended) and more specifically Regulations R.2652, R.2653 & R.2656 of 1985, as amended.

5.4.1 THE PRESENT STATUS OF THE ENS (FISHERMAN) COURSE

With special reference to the ENS (Fisherman) course, no separate guidelines have to date been tabled in Regulation R.2653 with regard to syllabi, equipment specification, examination and assessment.

As the syllabus for the Fisherman Grade 4 requires the candidate to

> "have a practical knowledge in the use and limitations of electronic navigation systems currently found on a large proportion of fishing vessels, e.g. radar, Decca navigator, echo sounder, radio direction finder, satellite navigator and electronic logs"

as per Regulation R.2653 (1985:25), a verbal agreement exists between the SADOT and TCS with regard to the prescribed syllabus and course structure for the ENS

(Fisherman) course.

5.4.2 REPERCUSSIONS ASSOCIATED WITH THE ENS (FISHERMAN) COURSE

An interview with Captain W R Dernier, Principal Officer of the SADOT, Cape Town revealed that there have been casualties, e.g. collisions and groundings, involving fishing vessels which were largely due to errors in navigation and the failure to correctly use on-board electronic navigation equipment.

In some of the cases, the persons contributing to these casualties were in possession of an ENS (Fisherman) course certificate.

This could imply that students were possibly competent during and immediately after attending the ENS (Fisherman) course at the TCS. With the passage of time the knowledge gained in this course became obliterated, especially if they are not routinely engaged in the use of electronic navigation equipment at sea.

Captain Dernier also indicated that many of the students were lacking the necessary competence, in the use and interpretation of electronic navigation equipment, during the oral component of the Fisherman Grade examinations.

The TCS, in defence, argues that the course content is covered in detail during the time allocated. They retort that the recruitment of personnel, with the necessary academic skills to cope with the course content, need to be addressed. Students, by their own admission, are in many cases not exposed and/or allowed to utilise on board navigation equipment aboard their vessels.

To indicate the commitment of the TCS, their 1992 second semester course programme indicates the following, viz.

* Fisherman Grade 4 (Duration - 12 weeks)

  Week 1: Basic chartwork and navigation.

  Weeks 2 to 7: ENS (Fisherman) course.

  Weeks 8 to 12: Chartwork, navigation and seamanship continued.

* Fisherman Grade 3 (Duration - 10 weeks)

  The subject 'ENS refresher' is incorporated into the course.

* Fisherman Grade 2 (Duration - 11 weeks)

  The subject 'ENS refresher' is incorporated into the course.

The shipowners, especially the smaller, less affluent, owner/skipper operations in retaliation to the allegation of both the TCS and SADOT with regard poor student performance, lament that they are only able to attract

applicants with poor educational and academic backgrounds often bordering on semi-illiteracy. This is despite the high rate of unemployment in the RSA, i.e. those with suitable qualifications are reluctant to live in the humble confines offered and/or work in the harsh fishing industry.

It must however be mentioned that the financial rewards for the qualified, skilled skippers are great depending on the tonnage, type and quality of the species caught.

5.4.3 CONCLUSION

In a possible attempt to remedy the situation, bearing in mind that the SADOT is responsible for safety standards aboard RSA vessels, the afore-mentioned department is in the process of:

* revamping the above-mentioned government regulations, which could possibly include clear, concise guidelines with regard to the ENS (Fisherman) course training and
* drafting watchkeeping certificates for the fishing industry to ensure that prospective candidates are routinely engaged in the operation of ENS equipment and general watchkeeping duties, a difficult process to police from ashore.

Mention should be made of the fact that South Africa is in a process of transition and more emphasis is placed on de-regulation to possibly accommodate the previously disenfranchised community. It must be noted that the manning and examination/qualification regulations, viz. R2652, R.2653, and R.2656 of 1985 as amended, have never discriminated against any South African, irrespective of race, colour or creed.

The SADOT have no doubt been pressurised by shipowners, labour unions and political organisations to de-regulate, which could possibly imply a reduction in internationally accepted standards.

Captain Dernier, however, strongly believes that safety standards cannot be de-regulated. He cites, in addition, that an educational process is required to achieve and maintain such safety standards.

With regard to the maintenance of training standards in the RSA, the mushrooming of rapidly developing in-house training institutions of, e.g. Sea Harvest and I & J, must seriously come into question in view of the fact that adequate training infra-stuctures are already in existence.

The present economic constraints and relatively small

size of the maritime industry does not warrant the existence of both the existing training institutions, viz. the Cape Technikon and TCS in Cape Town, and the flourishing in-house training institutions.

Should economics dictate the closure of the existing training institutions, i.e. making training an "own affair" for each shipowner, then a board such as the MITB could play a leading role in ensuring that internationally accepted standards are maintained throughout the RSA.

5.5 SUMMARY

This chapter illustrates the frustration that exists among shipowners, training institutions and government legislators/examiners with regard to poor student performance during Fisherman Grade examinations and more specifically those aspects relating to the correct use and interpretation of electronic navigation systems.

Each of the sectors mentioned above indicate that, despite various limitations, there is a continuing process whereby new techniques are being devised to possibly assist in achieving competency and better examination results.

The report have thusfar covered three of the four facets associated with the ENS training process, viz. the ENS course lecturer, the employer and the legislative authority, viz. the SADOT. To complete the training cycle, the opinions of the remaining facet, viz. the ENS (Fisherman) course students will be sought.

It was decided that the most effective way to collate the necessary data was by means of a questionnaire.

In an attempt to identify possible problems experienced by the students in the ENS (Fisherman) course, a questionnaire was forwarded to previous students who had completed the course.

The following chapter will thus outline the characteristics and investigate the problems experienced by the above-mentioned students, with a view of possible solution.

CHAPTER SIX: THE CHARACTERISTICS AND PROBLEMS OF THE ENS (FISHERMAN) COURSE STUDENTS

CHAPTER SIX

LIST OF FIGURES

CHAPTER SIX

THE CHARACTERISTICS AND PROBLEMS OF THE ENS (FISHERMAN) COURSE STUDENTS

6.1 INTRODUCTION

Chapter four characterised the ENS (Fisherman) course lecturer. Chapter five tested the opinions of the employers (shipowners) and SADOT examiners, with regard to the possible problems experienced by the ENS (Fisherman) course students.

In order to complete the chain of involvement the final link, viz. the ENS (Fisherman) course students, must be included in subsequent deliberations.

The objective of this chapter is thus to characterise the ENS (Fisherman) course students and to analyse, with a view of alleviating, the identified problems.

6.2 THE EMPIRICAL STUDY AND RESEARCH TECHNIQUE

Due to the unique situation confronted with, i.e. attempting to gather data from past ENS (Fisherman) course students who were possibly engaged in tours of duty at sea for periods ranging from four days to four

months, the researcher opted to utilise a questionnaire, viz. Questionnaire to students who have completed the ENS (Fisherman) course (Refer to Annexure A for the English and Annexure B for the Afrikaans translation).

The research group comprised all past ENS (Fisherman) course students enrolled at the TCS during the period January 1988 to December 1991, i.e. 232 students in total (refer to Section 1.4 in Chapter 1). Their

* latest known address,
* name and
* year in which each individual student attended the ENS (Fisherman) course

were recorded on a separate slip of paper and placed in a container. The contents of this container (population) were thoroughly mixed, whereafter a random sample of 100 students were selected by an impartial (blindfolded) individual for utilisation.

6.2.1 PROBLEMS ENCOUNTERED

Initially, the percentage returns of the questionnaire administered during June 1991 were extremely poor, viz. only 24 per cent by December 1991.

This necessitated a follow-up study of non-respondents, culminating in a final response rate of 54 per cent by

June 1992, i.e. 23,3 % of the total research group (232).

According to Behr (1973:80), "the mean percentage of questionnaire returns in respect of master's dissertations and doctoral theses from a large number of investigations was in the region of 70 to 80 per cent."

However, it must be borne in mind that these surveys were invariably made of homogenous groups with a reasonably higher level of education, such as university students, technikon students, college of education students or possibly even pupils at schools.

Many of these students spend anything from a semester to seven years at one of the above-mentioned institutions, making follow-up studies, if necessary, much easier.

The courses offered by the afore-mentioned institutions can accommodate relatively large groups, which implies larger samples and arguably greater validity in conclusions reached.

In contrast, the students which attended the ENS (Fisherman) course were heterogenous, with a relatively low level of education. Only a limited number of students, i.e. between 8 and 16, are allowed to attend the course which is of six weeks duration only.

It would appear that this could possibly be the first known research programme dealing with maritime education or training (verified by a computer search of the Institute of Research Development of the Human Sciences Research Council, during March 1990). This implies that it may be extremely difficult to define accepted norms, more specifically with regard to response rates, based on statistical data of similar studies done before.

The following are among the possible reasons (by no means an exhaustive list) for such a low final response rate, viz.

* Fishermen have lengthy spells at sea in the harshest working environment. The limited shore-leave granted is dedicated to family, friends and unresolved business. To complete a questionnaire could possibly enjoy very low priority.
* Fishing is seasonal and quota related, implying that a large number of students have possibly changed their last known address in a bid to remain employed throughout the year.
* A vast majority of this particular target population have a relatively low academic qualification (Standard 7 or less) and could possibly have felt threatened by a questionnaire of this magnitude.
* The administered questionnaire made no direct impact

on their present financial disposition and thus there was no great incentive, apart from moral obligation to assist future students, to return it.

* The questionnaire comprised of 55 carefully selected and worded items in both official languages, viz. English and Afrikaans. This could, arguably, be deemed to be excessive.

Consequently, the final response rate of 54 per cent, considering the limitations involved, could be considered reasonable if not above average.

6.3 CHARACTERISTICS OF THE ENS (FISHERMAN) STUDENTS

To fully comprehend the problems experienced by the ENS (Fisherman) course students, it is imperative that their characteristics are outlined first.

6.3.1 GENDER

From the questionnaire returns, the sample (N=54) indicated that all the students were male. According to the TCS no female have, to date, attended the ENS (Fisherman) course. This could more than likely be attributed to the harsh, rudimentary working environment associated with the fishing industry.

However, this male dominated scenario does not occur throughout the entire South African marine fraternity.

According to Harris (February 1992:8), "few women have joined the South African merchant navy. As is the case with their male counterparts some stay, some move on."

This is a recent trend, possibly due to a higher sophistication of working and living conditions aboard modern merchant naval vessels. These vessels rely more on cognitive/affective skills and less on the psycho-motor domain. Generally, the accommodation and cuisine are comparable to the best hotels ashore.

The Personnel Departments of various shipping companies contacted, verified that up to 20 July 1992 four females are serving in previously male dominated roles at sea, viz.

* Safmarine - 1 (Second Navigating Officer),
* Unicorn - 1 (Third Navigating Officer) and
* Portnet - 2 (Navigating Cadet Officers).

Figures released in a document of the MITB (1992:7) indicate that there are 591 deck officers presently serving in the South African merchant navy.

Compared to the total deck officer complement of the RSA,

the four serving females constitute a meagre 0,0068 per cent. According to the Personnel Departments of the four female officers, it would appear that their performance is no different to that of their male counterparts, and hopefully in the future the current imbalance will be eradicated.

6.3.2 AGE

The age distribution of the sample of ENS (Fisherman) course students are indicated by figure 6-1.

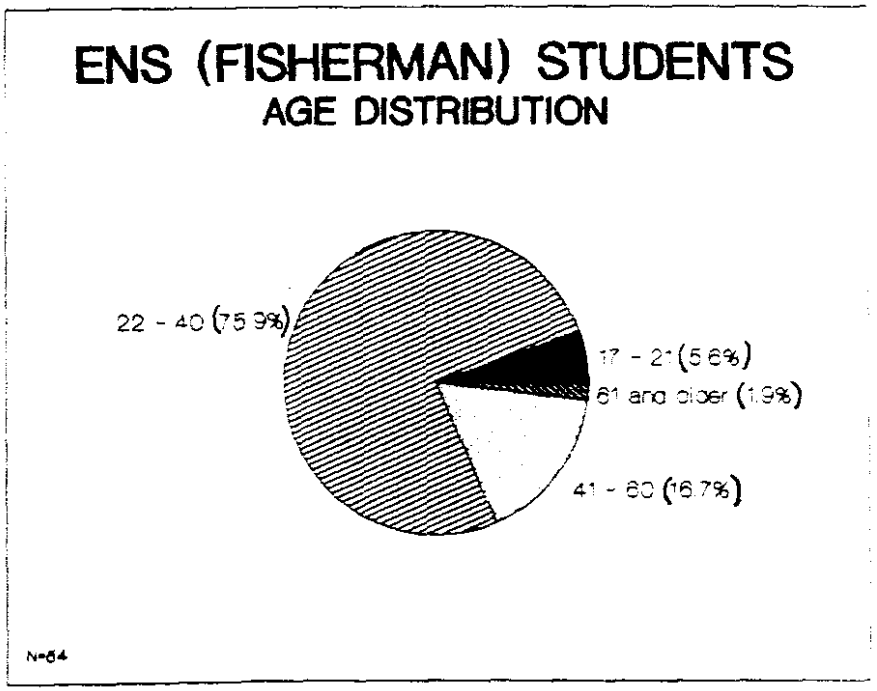

Figure 6-1. Age distribution of the ENS (Fisherman) students.

From figure 6-1, it is evident that the largest proportion of the sample were in early adulthood (21 to 40 years). The various phase developments are categorised according to Jordaan, et al. (1979:67), viz.

"Late adolescence (17 to 20 years)
Early adulthood (21 to 40 years)
Middle Age (41 to 60 years)
Old age (61 years and older)"

Jordaan, et al. (1979:67), continues that "there are no clear lines of demarcation between the various phases, but a gradual transition from one phase to the next. Development in a given phase is dependant on development in the preceding phases."

It is indeed encouraging to note that the majority of the sample of fishermen in possession of an ENS (Fisherman) course certificate are in early adulthood, indicating that they will be of service to the nation for at least the next twenty to forty years, before retirement.

What is however discouraging, is the low number of students falling in the late adolescence group. This could possibly be attributed to the high dropout rate during this phase of development. Care should however be exercised not to allow this figure to dwindle any further, as these are the skippers of the future.

6.3.3 QUALIFICATIONS, SEA SERVICE AND RANK STRUCTURE

Figure 6-2 indicates the academic qualifications of the ENS (Fisherman) course students.

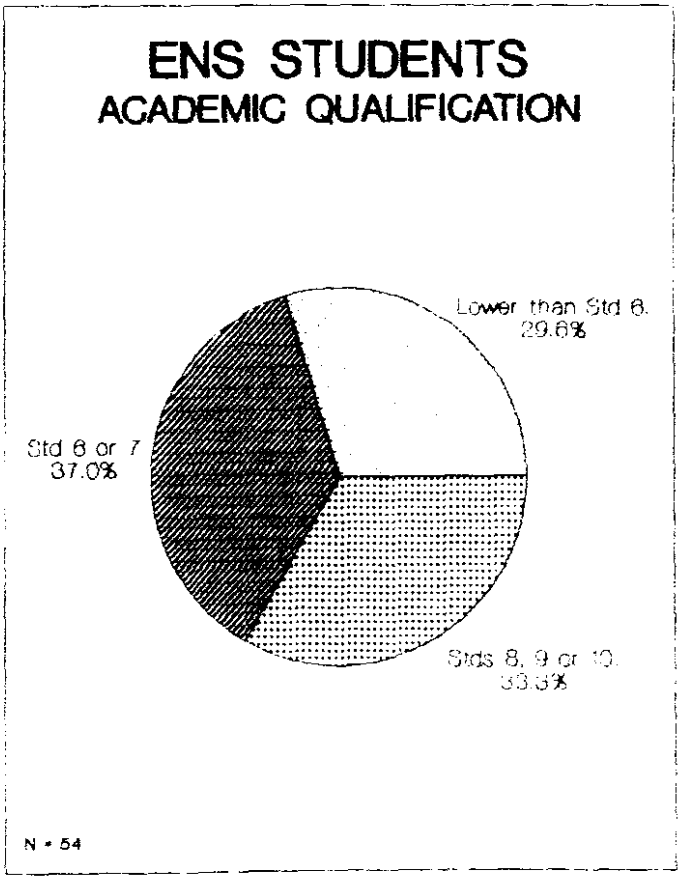

Figure 6-2. Academic qualifications of the ENS (Fisherman course students.

From figure 6-2, it is evident that two-thirds of the respondents had a qualification lower than Standard 8.

This situation requires serious attention and will have to be remedied in the future.

Ideally, students should have a higher school-leaving qualification, which includes Mathematics and Physical Science. This should enable them to cope better with required calculations and abstract concepts.

This situation will only remedy itself when incentives for being at sea far outweighs those offered ashore, viz. higher salaries, better living and working conditions, longer stays in port, to name a few. However, taking the poor economic climate fueled by political uncertainty into account, the present status quo will in all probability still be prevalent at the end of this century.

Shipowners, with their allegedly depleted reserves, are presently not in a position to improve the life of the seafarer. In the South African context a career at sea thus appears to be, ever increasingly, less lucrative.

The technical qualifications of the ENS (Fisherman) course students are indicated by Figure 6-3.

Some of the students also indicated that they are holders of degrees and diplomas in varying fields, such as the

Arts and Engineering, indicative of the acute unemployment rate.

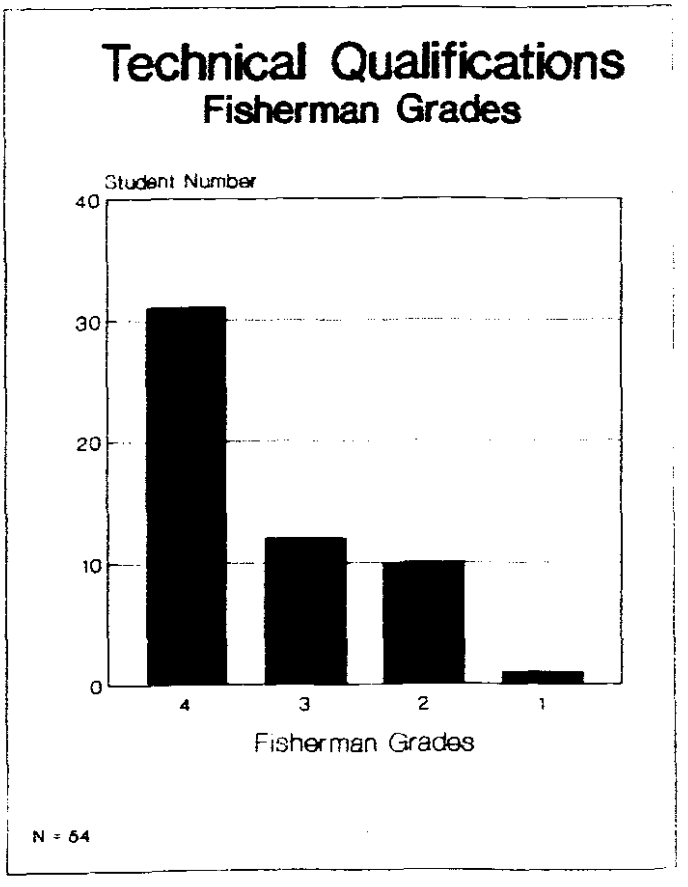

Figure 6-3. Technical qualification held.

Figure 6-3 illustrates that a large proportion of the sample of ENS (Fisherman) course students, viz. 57,4 per cent, are in possession of the Fisherman Grade 4 certificate of competency, the lowest grade. This qualification allows the holder according to Regulation R.2652 (1985:7), as amended, to sail as skipper of a fishing vessel greater than 25 gross registered tonnes, but less than 100 gross registered tonnes and within 50

nautical miles (92,6 kilometres) from the shore, or in a lower capacity on larger fishing vessels working at greater distances from the shore.

This large number of Fisherman Grade 4 certificate of competency holders is encouraging. It indicates that there exists a sufficiently large trained human resource to adequately serve within the fishing industry and tend to the need of the RSA in the future.

Figure 6-4 indicates the relationship that exists between the amount of sea service performed (Series A) and the on-board rank structure (Series B).

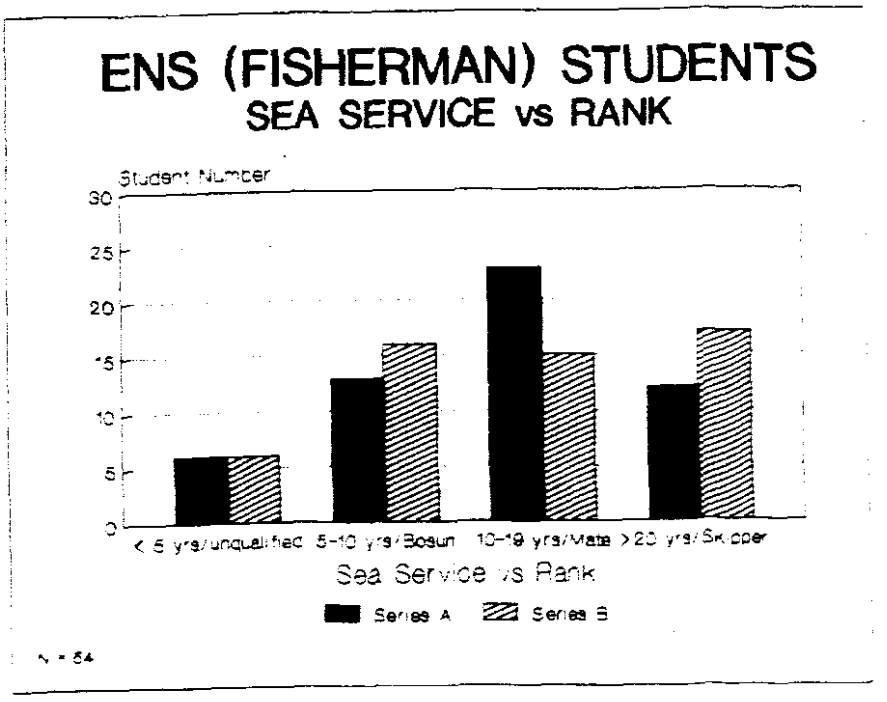

Figure 6-4. Sea service versus rank structure.

From Figure 6-4, the importance of qualifying sea service is evident with reference to the corresponding rank structure. In order to qualify for senior ranks in a sea-going capacity, where higher levels of responsibility are required, it is imperative that incumbents have the necessary experience and qualifications as required by the MSA, as amended (There is no substitute for practical sea-going experience).

6.3.4 CATEGORY OF FISHING INDUSTRY SERVED

Figure 6-5 indicates the type of fishing industry the sample of ENS (Fisherman) course students are serving within.

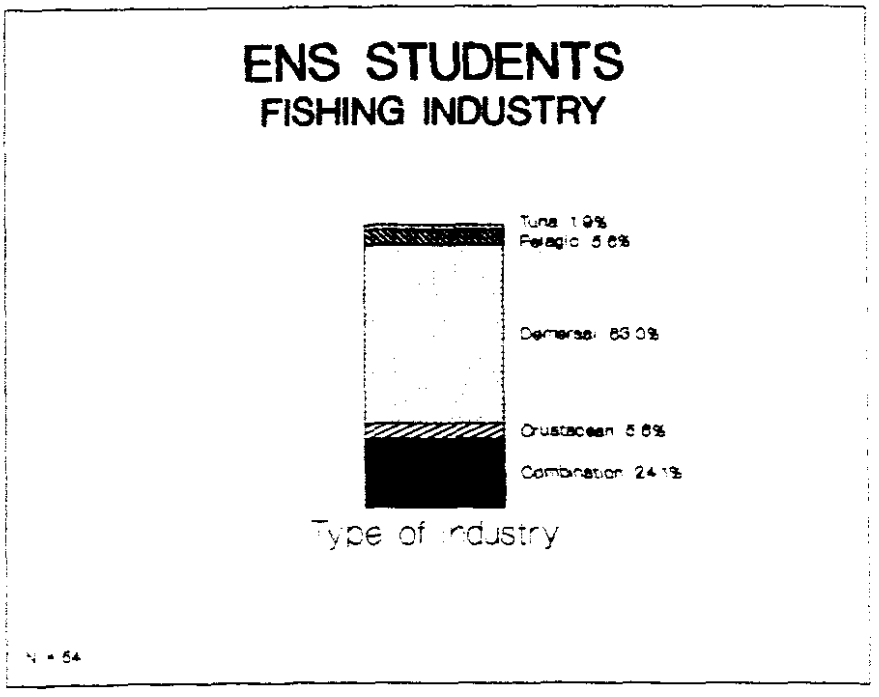

Figure 6-5. Category of fishing industry served.

It is evident from Figure 6-5 that the majority of ENS (Fisherman) students serve on demersal (bottom) trawlers. Generally, demersal trawlers are much larger in size than their counterparts engaged in the other forms of fishing. Their area of operation is normally greater than 50 nautical miles (92,6 kilometres) from the shore.

According to the Regulation R.2653 (1985:17), as amended, the ENS (Fisherman) course certificate is a pre-requisite for the Fisherman Grade 3 certificate of competency examination.

Regulation R.2652 (1985:7), as amended, further stipulates that all vessels greater than 25 gross register tonnes, working between 50 and 200 nautical miles (370,4 kilometres) within the limits of the Defined Fishing Zone, shall have in accordance with the minimum manning scale a Fisherman Grade 3 certificated officer on board.

The Defined Fishing Zone according to Regulation R.2652 (1985:2), as amended, "shall mean the area southward from Latitude 5 degrees South to Latitude 50 degrees South and eastward from the Greenwich meridian (000 degrees) to the meridian of Longitude 40 degrees East."

Vessels serving the crustacean, pelagic and tuna industries are generally less than 25 gross registered tonnes and work within 50 nautical miles from the shore. These vessels only require two Fisherman Grade 4 certificates of competency on-board in order to satisfy the minimum manning scale, for which the ENS (Fisherman) course certificate is not a pre-requisite.

Due to the quota system, 24 per cent are engaged in a combination of the various types of fishing. This flexibility ensures employment and income throughout the year.

Although the work environment and conditions on-board are in most instances harsh, the rewards are high. Of the sample of ENS (Fisherman) course students, 64 per cent are earning in excess of R 5000,00 per month. This factor is, however, largely dependent on the type, quality and quantity of fish species caught.

Although the above-mentioned earnings appear to be high, mention should be made of the fact that, in general, fishermen are restricted by quotas and seasons. This infers that they could only be employed for a few months per annum. A poor season could, in addition, have disastrous effects on their income.

6.3.5 EMPLOYER

Figure 6-6 illustrates by whom the sample of ENS (Fisherman) course students are employed.

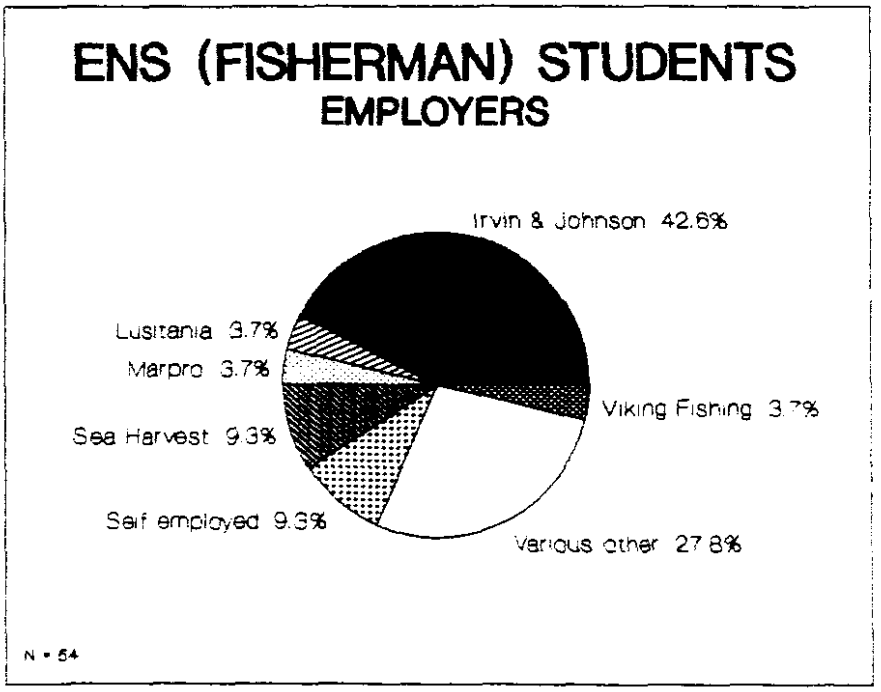

Figure 6-6 The employers of the ENS (Fisherman) students.

Figure 6-6 is indicative of the situation within the fishing industry in South Africa, viz. that the major shipowners train the majority of students. Despite the lack of statistical evidence, it is common knowledge that the poaching of qualified students are rife within the maritime industry which allays the allegedly expensive costs of training own personnel.

To resolve this unhealthy situation and to standardise on-board training, the fishing industry should perhaps formulate a training pool from which required trained personnel can be borrowed. To sustain this training pool, each shipowner should include a contribution equivalent to his need, which will cover all training costs.

The training pool should consist of the following parties, viz.

* All RSA shipowners in both the merchant navy and fishing industry.
* The existing education/training institutions and/or in-house training centres.
* Martime Industry Training Board.
* SADOT, Shipping Directorate, Marine Division.
* Trade Unions and Labour Organisations.

6.3.6 NATIONALITY AND LANGUAGE COMPETENCY

Of the 54 respondents 93 per cent are South African citizens and the remainder foreigners, mainly Portuguese.

With reference to one of the official languages, viz. English, 78 per cent of the respondents could speak, 87 per cent could read and 81 per cent could write therein.

Figures for the other official language, Afrikaans, were similar, viz. 85 per cent of respondents could speak, 72 per cent could read and 72 per cent could write therein.

Although the percentages indicated above appear to be relatively high, it must be noted that generally the level of communication, i.e. fluency and standard, is extremely low. Few students are really articulate in either of the official languages which eventually have a detrimental effect on their progress.

Fishermen, in general, practice a dialect which in simple terms is a blend of English and Afrikaans and is unique to South Africa. During the written component of the ENS (Fisherman) course they are encouraged to write in either of the official languages. Many do, however, respond in the dialect with which they are so familiar. As marks are allocated for correct content, rather than correct language usage and spelling, they are not penalised.

The option of an oral examination in the ENS (Fisherman) examination is made available to those students who feel that a written examination will negatively influence their results. It is difficult to mention exact figures, as this varies from intake to intake. However, 10 per cent per annum would be a fair approximation.

6.3.7 FAMILY STRUCTURE OF THE ENS (FISHERMAN) STUDENT

Concluding on a personal nature, the 54 respondents indicated that 65 per cent were married, 30 per cent were single with the remaining 5 per cent either divorced or living together while attending the ENS (Fisherman) course.

These figures are astonishing considering the torridly difficult family life seafarers lead, i.e. similar to the migrant worker where the fisherman spends extremely little time at home.

In addition, these figures could be considered impressive, if not baffling, considering that it has been alleged that South Africa have one of the highest divorce rates world-wide. This scenario is perhaps a possible indication of the importance of quality time for these respondents within the family environment.

6.4 POSSIBLE PROBLEMS EXPERIENCED BY THE ENS (FISHERMAN) COURSE STUDENTS WHILE AT COLLEGE (TCS)

The objective of this section is to identify and possibly solve the problems experienced by the students of the ENS (Fisherman) course.

Possible problem areas have been divided into two broad domains, viz.

* problems experienced while attending the ENS (Fisherman) course (college phase) and
* problems experienced at sea, prior to attending the ENS (FIsherman) course (practical and observation during the sea-going phase).

In this section the problems of the students, while attending the ENS (Fisherman) course will be examined. Problems of the second domain will receive attention in the next section, viz. section 6.5.

6.4.1 RESIDENCE AND COMMUTING TIME

Figures released, indicated that while attending the ENS (Fisherman) course 81 per cent of respondents commuted from their own house or flat while the remaining 19 per cent stayed at a hotel, hostel or boarding house. Of the latter, 13 per cent found the study facilities totally inadequate, citing no privacy, high noise levels and a crammed environment as being among the main causes of concern.

Furthermore, 67 per cent relied on public transport to commute from their base to the college. Figure 6-7 indicates the amount of time dedicated in travelling from

their base to the college.

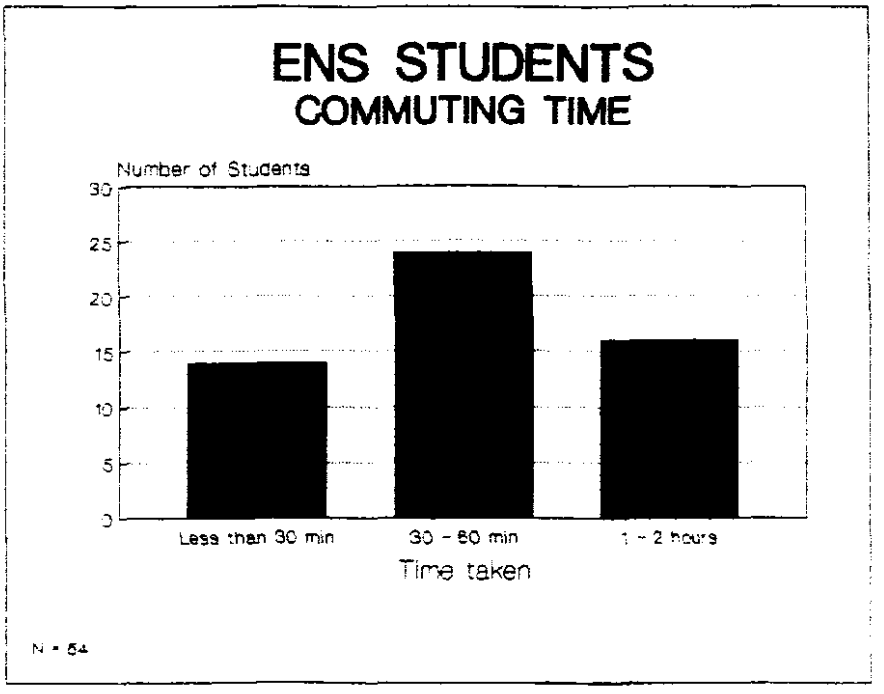

Figure 6-7. Commuting time from base to college (TCS).

Figure 6-7 indicates that 70 per cent of the ENS (Fisherman) course students possibly stay within the metropolitan area, taking less than one hour to commute from their base to the college. However, 30 per cent of these students spend between 2 and 4 hours travelling time daily. This could be deemed to be excessive as such a high impact, six week course requires a reasonable amount of consolidation to be executed after college. These students are not only losing valuable time but, in all probability, are unduly fatigued because of the extended day.

A possible solution to this problem would be for either

the college or shipowners, via the earlier proposed training pool, to provide suitable hostel facilities close to the TCS for those students coming from afar.

6.4.2 CERTIFICATED OR UNQUALIFIED

Of the 54 respondents, 61 per cent were in possession of a certificate of competency, viz. Fisherman Grade 4, 3, 2 or 1, at the time of attending the ENS (Fisherman) course.

The remaining 39 per cent were unqualified deckhands who, in all probability, have never been exposed to the various electronic navigation aids on-board the vessels they serve. This statement has been verified by various deckhands indicating that the hours worked are lengthy, dependent on the catch, which leaves very little time for training or studies.

Not only does this unacceptable scenario cause undue anxiety and frustration among students during the ENS (Fisherman) course, but the knowledge gained is soon lost if not consolidated subsequent to the college phase, i.e. while at sea.

A possible solution would be to have three separate courses, viz.

* ENS (Orientation) of 3 weeks duration - for ratings attempting the Fisherman Grade 4 certificate of competency examination and
* ENS (Fisherman) of 6 weeks duration - for officers attempting the Fisherman Grade 3 certificate of competency examination.
* ENS (Remission) of 3 weeks duration - for cadets (having a Standard 8 or higher school leaving certificate with passes in Mathematics and Physical Science) who have successfully completed the ENS (Orientation) course and wish to attempt the Fisherman Grade 3 certificate of competency. Alternatively, cadets could enrol for the ENS (Fisherman) course depending on their capability.

6.4.3 COURSE DURATION AND COURSE MODULES

Of the 54 respondents, 35 per cent were of the opinion that the present ENS (Fisherman) course duration was too short, with the result that they found the pace too strenuous to cope with.

They indicated that by increasing the course duration by an additional two weeks, this problem may have been alleviated. This could, however, lead to other problems, e.g. shipowners being unable to release these students for an additional period, because of economic and

man-power restraints.

With regards to the number of modules included in the course, 24 per cent of the respondents indicated that there were definitely too many.

In contrast, those who were able to cope with the pace of the course intimated that additional modules, such as Navstar - GPS, ARPA and the Sonar (Sound Navigation and Ranging) should be included in the course.

With regards to the electronic navigation equipment utilised, 41 per cent of the respondents stressed that the ENS course equipment required upgrading or replacement with the latest available models.

Although it would certainly be ideal to work on the latest available models this argument would, in all probability, not prove cost-effective in the existing depressed economic climate.

What is becoming more evident is the fact that, in the not too distant future, the shipowner will, in all probability have to bear the running costs of the TCS.

The previously mentioned and envisaged training pool would perhaps in the future have to implement a fund to

accommodate such a need.

6.4.4 COURSE PRESENTATION

An overwhelming 96 per cent of the respondents indicated that both the language used in the handouts and the language utilised by the lecturers were in a language of their choice and of such a nature that it was easy to understand.

Despite the simplification of the language, 35 per cent still had difficulty in understanding difficult abstract concepts and the new technical terms.

In addition, 19 per cent stated that the handouts, despite its simplicity, could not clarify those concepts they were having difficulty with, e.g. the relative motion (vector) plot, electromagnetic waves and hyperbolic navigation systems.

In a bid to alleviate this problem, the TCS have acquired video cassette recordings, on the above-mentioned topics, from the UK. Additionally, it is also in the process of developing its own Personal Computer (PC) based soft-ware which would assist in addressing the problems experienced by the ENS (Fisherman) course students.

Figure 6-8 indicates how students coped with the lecturer's pace.

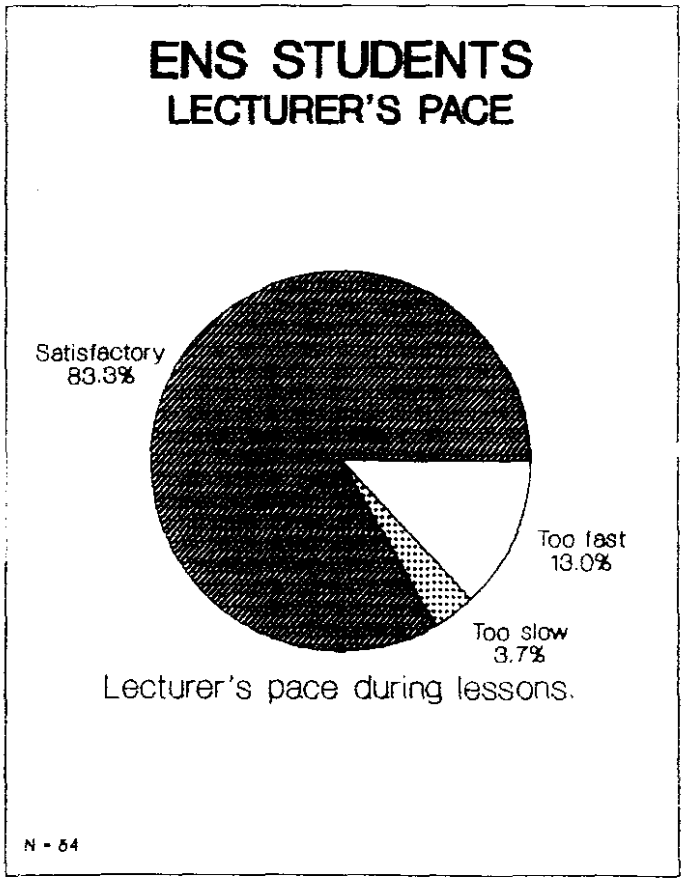

Figure 6-8. Lecturer's pace during lessons.

From figure 6-8 it is evident that 83 per cent of respondents were satisfied with the pace at which lessons progressed. However, 13 per cent felt that the lesson progressed at too fast a pace, while the remaining 4 per cent felt the pace frustratingly slow.

As the lesson progressed, 98 per cent felt entirely free

to raise questions on concepts which posed a problem. Of the respondents, 93 per cent confirmed that these questions were satisfactorily resolved before the termination of the lesson.

6.4.5 THE COMPOSITION OF THE CLASS GROUP

Of the 54 respondents, 85 per cent found themselves in a heterogenous classgroup, i.e. one consisting of any combination of the following ranks, viz. deck cadets, deckhands, bosuns, mates and skippers.

For practical reasons no shipowner would be prepared to release large numbers of either skippers or mates to attend courses, as their vessels would not be able to proceed to sea. The cost of having senior officers, only, on a particular course could also from a financial point of view be costly.

Oncemore, the advantages of a training pool is evident. One senior officer, from each of the various companies, could be released to eventually form a more homogenous group.

With the proposal put forward in section 6.4.2 concerning three differing ENS courses, the problem of heterogenous classgroups may be eliminated. The present status quo is

certainly not conducive to the the learning process and should be resolved by the TCS in collaboration with the fishing industry and SADOT.

6.4.6 TESTING AND EVALUATION OF STUDENTS

With regards to oral, practical and/or written tests at the completion of each module, 87 per cent of respondents found the frequency and method of testing or evaluation satisfactory.

The remaining 13 per cent opted for one, comprehensive examination upon completion of the entire course. This system of examination has its merits, but for this specific target group, i.e. one with a low academic background, regular testing/evaluation followed by consolidation is advisable.

6.4.7 VALIDITY OF THE ENS (FISHERMAN) COURSE

A significant 98 per cent of the 54 respondents found the ENS (Fisherman) course to have been of great educational value. Some, however, indicated that the course should be re-validated or updated on a regular basis, via the relevant legislation, viz. MSA, as amended.

Figure 6-9 demonstrates that 89 per cent of the sample of

ENS (Fisherman) course students indicated a necessity to re-validate the obtained ENS (Fisherman) course certificate on a regular basis (Series A).

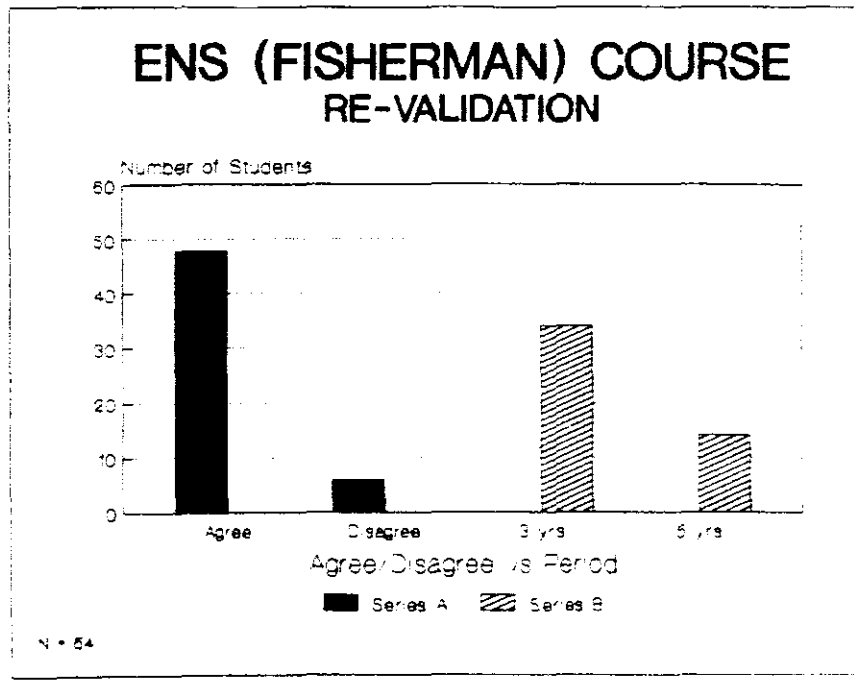

Figure 6-9. Re-validation of ENS (Fisherman) course.

Among those in favour of re-validation, 71 per cent of respondents agreed that this should occur every 3 years. The remaining 29 per cent opted for a 5 yearly period (Series B). Presently there exists no requirement for the re-validation of the ENS (Fisherman) course (an ancillary course and requirement for the Fisherman Grade 3 examination) according to the MSA, as amended.

The concept of re-validating certificates is not unfamiliar to the mariner. Of the other ancillary certificates requiring re-validation, as per Regulation R.2656 (1985:111),as amended, are

* Sight Test Certificate - valid for 6 months
* First Aid at Sea - valid for 3 years
* Ship Captain's Medical Training - valid for 3 years
* Fire Fighting Course - 5 years
* Deck Officer Class certificate of competency - 5 yrs

It makes good sense to re-validate the ENS (Fisherman) certificate, considering the rapid developments in the field of elctronic navigation systems. However, major drawbacks are,

* no re-validation requirement exists for the electronic navaids course required by the merchant navy, i.e. for holders of Deck Officer Classes. This could possibly be due to in-frequency and high cost of the NIS course offered by the Cape Technikon's Department of Maritime Studies.

  Subsequent implementation within the fishing industry, i.e. for the Fisherman Grades, could then be deemed to be discriminatory.

* To date, South African shipowners in general, have

perceived maritime training to be a necessary evil. Any additional cost involving re-validation would in all probability be frowned upon, i.e. although it makes good educational sense, to them it could make poor economic sense.

6.4.8 MISCELLANEOUS PROBLEMS

A meagre 13 per cent of respondents identified miscellaneous problem areas, such as

* a cramped classroom environment,
* outdated equipment and
* a serious deficiency of instruments, i.e. one instrument serving eight students.

The problem of a cramped environment have been resolved by the TCS when it re-located to its new designer campus during August 1991.

With regards to outdated equipment and the deficiency of instrumentation, the TCS argues that the state does not have the necessary funds for upgrading or increasing its existing ENS instrumentation. As mentioned in section 6.4.3, it would appear that the future and survival of maritime training in the RSA will largely be dependent on the responsibilty and commitment of the South African shipowner.

Presently, the South African maritime community appears to be in an economical deadlock with regards maritime training.

The importance of Section 2.4 (Refer Chapter 2) which states "that if a price is put on maritime training, ultimately, the increasesd cost of re-training and remedying disasters, will serve as evidence of previous short-term savings" must once-more be emphasised.

6.5 POSSIBLE PROBLEMS EXPERIENCED BY THE ENS (FISHERMAN) COURSE STUDENTS AT SEA.

It must be emphasised that both the college and sea-going phases of any form of maritime training are inter-dependant.

Ideally, the entire process should not be compartmentalised, but addressed as a whole; a Gestaltist principle which simply means, according to Jordaan et al. (1979:7), that "the whole is greater than the sum of its constituent parts."

The interviews with the major shipowners in the South African fishing industry demonstrated that training programmes have been initiated. The question remains, however, whether these training programmes are executed

and monitored at sea. The shipowners answer in the affirmative.

Evidence from students, by their own admission and in consultation with both the TCS (college) and SADOT (examining authority) indicate otherwise, i.e. students in many cases display a serious lack of exposure to equipment prior to (and in some cases after) their college phase.

What becomes more and more evident is that the actual fishing process, which is of economic importance to both the shipowner and its crews enjoys, understandably, much higher priority than, e.g. on-board training or safety.

6.5.1 EXPOSURE TO AND UTILISATION OF ENS EQUIPMENT

As to exposure to navigation equipment (Series A in Figure 6-10) while either deck cadet or deckhand, prior to attending the ENS (Fisherman) course, 69 per cent of respondents replied in the affirmative while the remaining 31 per cent replied negatively. The response ratio was exactly the same, as above, when it came to the actual utilisation of navigation equipment (Series B in Figure 6-10) for position fixing under the guidance of a certificated officer or skipper.

Of the 54 respondents, 76 per cent were briefed on operational procedures of navigation equipment (Series C in Figure 6-10), prior to joining the ENS (Fisherman) course. Figure 6-10, indicates pre-college preparation.

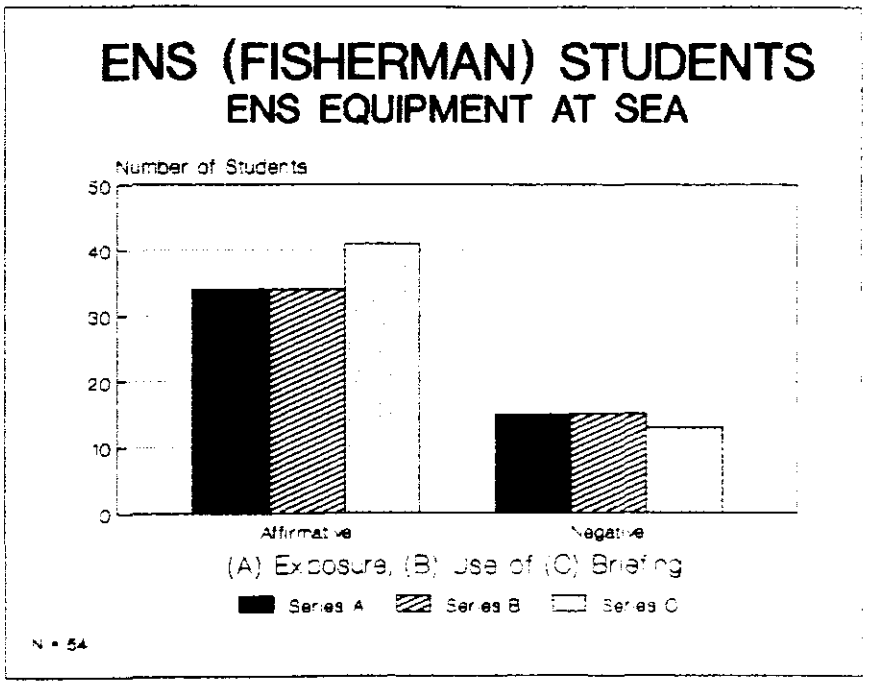

Figure 6-10. Pre-college preparation.

6.6 CONCLUSION

From the afore-mentioned analysis it becomes quite evident that maritime training in the RSA, more specifically training within the fishing industry, will seriously have to be re-evaluated.

It would appear that economics, in stead of sound

educational principles, will dictate the future of maritime training in the RSA and perhaps, worldwide.

6.7 SUMMARY

The objective of this chapter was to obtain information from past ENS (Fisherman) course students with regard to their feelings about the afore-mentioned course.

Despite the antipathy experienced during the gathering of valuable empirical data in a bid to assist in alleviating the plight of students attending the ENS (Fisherman) course, it was found that there exists an aura of optimism within maritime training spheres in the RSA.

This penultimate chapter merely identified the problems experienced by the ENS (Fisherman) course students. In the next chapter certain recommendations will be made.

CHAPTER SEVEN: CONCLUSION

CHAPTER SEVEN

CONCLUSION

7.1 SUMMARY

It was indicated in Chapter 1 that possible recommendations with regard to the problems experienced by the ENS (Fisherman) course students would be tabled.

During the course of this research it became increasingly evident that the problems experienced on this microlevel was possibly also experienced at a macrolevel, i.e. throughout the entire spectrum of training structures within the South African fishing industry. This assumption is based on the fact that there exists many common denominators at both the micro- and macrolevels, viz.

* educational, vocational and socio-economic background;
* poor command of both official languages, i.e. English and Afrikaans;
* lack of exposure to instrumentation within junior ranks and on-board, in-house training programmes;
* contrasting factors such as age vs experience in the same class-group, i.e. an unacceptable heterogenous composition and

* distance between place of study and home, i.e. lack of suitable hostel facilities whilst on course.

Subsequently, any recommendations made in this report could, in certain instances, also apply at macrolevels which are either directly or indirectly influenced.

Due to the low level of awareness with regard to the maritime industry in the South African context, a brief historical perspective on both marine navigation and the TCS is outlined in Chapter 2.

In comparison with, e.g. the agricultural industry in the RSA, our maritime industry is relatively small. For this reason a comparative study was made of similar courses offered both locally (Cape Technikon and SAN) and abroad (Australia, Denmark, Germany, UK and USA) in Chapter 3.

Chapter 4 dealt with the training, industrial and teaching experience, teaching and technical qualifications, other subjects taught and general interests of the ENS (Fisherman) course lecturer.

In Chapter 5, SADOT, (legislative examining authority) and South African shipowners (employers) were invited to voice their opinions with regard to possible problems experienced by the ENS (Fisherman) course students.

By means of the questionnaire appended as Annexure A (Annexure B - Afrikaans version), viz. Questionnaire to students who have completed the ENS (Fisherman) course, information was obtained from the above-mentioned students with regard to their characteristics and feelings toward the ENS (Fisherman) course.

The analysis of the questionnaire indicated that there is room for improvement with regards maritime training in South Africa at both micro- and macrolevels.

7.2 FINDINGS AND RECOMMENDATIONS

It must be noted that the recommendations made in this report purely represent guidelines. They could possibly serve in a new dispensation within maritime training at both the micro- and macrolevels.

7.2.1 NATIONAL MARITIME TRAINING POLICY FOR THE RSA

Presently, South Africa is in a state of political flux in a move away from apartheid. Whatever the new political structures of the future, it is recommended that, at earliest convenience, all the major role players involved with maritime education and training, viz.

* Maritime education/training institutions and the

Department of National Education (DNE)

* MITB
* Maritime students' representatives (employees)
* Maritime Trade Unions
* SADOT (state) and
* South African Navy (SAN)
* Shipowners (employers)

have their own mini-Codesa (sic) and collectively address and re-structure the problems encountered in maritime education and training to secure the future of this relatively small, but high impact industry.

According to the magazine **New Frontiers** (December 1991: 11) the MITB (RSA) was formed in December 1990. On 17 June, 1992 a one-day maritime training conference, co-ordinated by the MITB for the maritime industry of the RSA, was held in Cape Town which the researcher was able to attend.

A spirit of reconciliation and optimism prevailed at this conference and all delegates present unanimously agreed that a National Maritime Training Policy should be formulated and implemented.

This is indeed a daunting task, aggrevated by present economic constraints and should not be under-estimated. Existing structures are in disarray and unacceptable.

Figures released at the MITB conference confirmed that there are approximately 10 000 serving sea-going personnel in the RSA out of a total population of approximately 40 million. This gives an indication on how relatively small, but important the maritime industry is with special reference to the:

* fishing industry feeding the nation;
* import/export trade, serviced by the merchant navy and the
* SAN responsible for the defence of the vast RSA coastline.

7.2.2 IN-HOUSE TRAINING FACILITIES

Due to, among others, geographical and economic factors (Ref. pp. 144, 152) many shipowners, e.g. Irvin & Johnson (Cape Town), Portnet (Durban), Sea Harvest (Saldanha Bay) and Unicorn (Durban) have implemented their own in-house training centres. This process had a devastating effect on the enrolment of the existing colleges, i.e. Cape Technikon, Natal Technikon and TCS to such an extreme that complete closure is imminent, to the possible detriment of the South African maritime fraternity.

Once these existing infra-structures become non-existent, it is going to become increasingly difficult to procreate

the same in the future.

Presently, South Africa cannot afford the luxury of both the under-utilised maritime colleges and the perpetuation of in-house training academies.

Recommendation

It is thus recommended that the proposed mini-Codesa, consisting of representatives of the following parties, viz.

* Education/training institutions and DNE;
* MITB;
* SADOT;
* SAN;
* Shipowners in both the merchant navy and fishing industry and the
* Trade Unions/Labour Organisations

establish exactly what the shipowners' needs are and formulate a cost-effective National Training Policy.

In the final analysis, the shipowner must indicate whether they are going to support the maritime training colleges and cease in-house training programmes; or continue developing in-house training structures with cessation of the existing maritime training colleges.

7.2.3 ACADEMIC BACKGROUND OF THE STUDENTS

Many of the problems experienced by the ENS (Fisherman) course students are mainly due to poor educational background (Ref. pp. 17, 90, 165).

Recommendation

It is thus recommended that all prospective students opting for a sea-going career (at both micro- and macro-levels) have a minimum Std. 8 school-leaving qualification with passes in Mathematics and Physical Science. Those not qualifying, should attend a suitable bridging course in order to upgrade them to the required standard.

7.2.4 LIVING AND WORKING CONDITIONS ON-BOARD

The above recommendation will only be effective once living and working conditions aboard, fishing vessels in particular, improve (Ref. pp. 6, 150, 166). Few matriculants choose a sea-going career due to these conditions.

Recommendation

It is thus recommended that the shipowner and trade unions collectively decide on minimum standards with regard to on-board living and working conditions, for

both officers and ratings, on existing and newly-built vessels.

7.2.5 HETEROGENOUS COMPOSITION OF THE ENS (FISHERMAN) CLASS

The large age differences and differing levels of experience, i.e. heterogenous composition of the ENS class group at both micro- and macrolevels (Ref. pp. 13, 90, 159) was definitely not conducive to the learning process.

Recommendation

It is thus recommended that a national training pool (Refer p. 173) be formulated. The proposed training pool will be sustained by all parties on a pro rata basis. It will thus become easier for each shipowner to release one student, e.g. a skipper, instead of two or more to obtain a homogenous classgroup.

Without a training pool, the vessels of a particular shipowner/employer will be unable to sail, because the minimum manning criteria, as per Regulation R.2652 (1985: 7) as amended, will not be satisfied. It is easier to replace one student on a study programme than a number of the same rank in one company.

7.2.6 PROPOSED AMALGAMATION OF ENS TRAINING RESOURCES

The objectives of the electronic navigation based courses of the TCS and Cape Technikon's department of Maritime Studies are similar, albeit for different target groups (Ref. pp. 51, 52).

Presently, the radar simulator of the TCS is able to drive, in real time, one own ship (Ref. p. 75) while that of the Cape Technikon has three interactive own ships. The existing equipment of the TCS could be used solely as a plotting trainer and that of the Cape Technikon for training in collision avoidance, navigation control or bridge team management.

Recommendation

It is thus recommended that the under-utilised, highly sophisticated ENS equipment and the existing expertise of both institutions be combined in order to serve the maritime industry more effectively from both an economic and educational viewpoint.

Ideally, the Granger Bay campus of the Cape Technikon should be retained to serve as a future unified maritime institution.

7.2.7 FORMULATION OF A NEW MARITIME TRAINING DISPENSATION

Under the existing legislation, i.e. Technikons' and Technical Colleges Act, it would be extremely difficult to implement the above recommendation.

Recommendation

It is thus recommended that all maritime education and training fall under a special dispensation, for example a Maritime College Act catering for all levels of maritime education and training, e.g. Bremen Polytechnic in Germany (Ref. p. 107).

This will enable this specific institution to do all levels of training, viz. post-school, pre-matric technical vocational training and post-matric (or tertiary) technical training. This type of institution would thus be able to confer its own degrees, national diplomas, national technical certificates or certificates of competency, dependent on the level of qualification required.

The training needs of the SAN could possibly also be accommodated at such an institution.

Alternatively, a special contract of co-operation between the two institutions could be formulated, to make provision for the co-operative training of students. In this way the respective resources could be utilised more cost-effectively. It is believed that the autonomous status of the Technikons empower them to effect such agreements.

7.2.8 ON-BOARD TRAINING PROGRAMMES

Seafaring have dramatically changed in the last two decades. Time spent in port is down to a minimum, less than 6 hours in some cases, due to modern load/discharge techniques, e.g. containerisation and the ro-ro concept. Extremely little time is thus dedicated to on-board training programmes, largely due to the busy schedules modern vessels have.

Recommendation

It is thus recommended that the RSA should invest in a multi-purpose, contemporary, sea-going training vessel to serve both the fishing industry and merchant navy. The 31 year old training vessel RSA is not only costly to maintain, but does not fulfil the present day training requirements of the maritime industry (Ref. p. 49, 50,

189).

An additional recommendation would be for the training institution to operate the training vessel. The financial responsibility would lie with the state and the industry it serves.

During the sea-going phases, many of the problems experienced at both micro- and macrolevels, such as basic shiphandling, bridge team management (Ref. p. 140), watchkeeping duties and the correct utilisation and interpretation of ENS and other equipment (Ref. p. 148 will be eliminated. The concept of qualifying sea-service (Ref. p. 169) will be satisfied.

Progress during the sea-going phase could be monitored by means of a standardised log-book system (Ref. p. 138) which should be presented (all modules completed) to the SADOT examiner for certificate of competency examinations.

It is further recommended that a pre-sea course similar to that offered by the DMA (Ref. p. 102) be structured, in collaboration with the SAN, to equip prospective candidates in self-discipline, and the various ancillary courses (basic seamanship and nautical terminology, basic hygiene fire fighting, first aid, proficiency in survival

craft and watchkeeping duties) prior to the sea-going phase.

To accommodate students during the college based phases, it is further recommended that suitable boarding facilities, incorporating a study, be made available to those students from afar (Ref. p. 176).

7.2.9 FORMAL TEACHING QUALIFICATIONS OF THE ENS (FISHERMAN) COURSE LECTURER

Without exception, all prospective lecturers do not hold a formal teaching qualification prior to joining the maritime colleges (Ref. p. 126).

Recommendation

It is thus recommended that this target group be identified, preferably during the earlier phases of their careers and be given the opportunity to either obtain this qualification on a full-time basis or via tele-tuition, e.g. Technikon RSA. The practical component could be done via the maritime institution.

Further, it is recommended that minimum entrance criteria for prospective lecturers be promulgated, based on technical/teaching experience and technical/teaching

qualifications.

7.2.10 MARKETING OF CAREERS AT SEA

There exists an extremely low level of awareness among South Africans in general with regards to maritime related training and career opportunities, despite the vast coastline of the RSA (Ref. pp. 18,19).

Recommendation

It is thus recommended that vigorous marketing and public relations programmes be initiated by the maritime fraternity to encourage South Africans to seek sea-going careers.

7.2.11 RESEARCH IN MARITIME EDUCATION AND TRAINING

To date, research within the maritime sphere have seriously been lacking (Ref. p. 160).

Recommendation

It is thus recommended that a greater emphasis is placed on the importance and benefits of research. Lecturers at maritime institutions should be encouraged by, e.g. study grants and bursaries, to undertake research programmes

not only to upgrade their existing qualifications, but also to address and possibly solve perturbing problems existing throughout the entire maritime spectrum.

7.3 SPECIFIC PROBLEMS AND SHORTCOMINGS EXPERIENCED DURING THE RESEARCH

Due to the fact that no previous research was done in the field of ENS for the fishing industry, merchant navy or SAN, made the collating of the necessary data frustrating to a point that it retarded progress. Despite this shortcoming, it was a challenging exercise.

The interviews with the shipowners and SADOT in general was successful, but due to the sensitivity of questions and perhaps the uncertainty with regards to the objective of the research, certain questions were answered elusively, or not at all.

The slow response rate of the completed questionnaire to past ENS (Fisherman) course students (Refer Annexure A and B) retarded the progress of the research and this necessitated a follow up study.

Despite these few factors, no debilitating problems were encountered.

7.4 AREAS REQUIRING FURTHER INVESTIGATION

Here follows a summary of possible areas requiring further research, viz.

* Causes of high student failure rate for the SADOT certificate of competency examinations.
* Minimum standards with regard to on-board service, i.e. living and working, conditions.
* The utilisation of foreign personnel on RSA registered vessels and the implications on the future of maritime training in the RSA.
* Formulation of a national cost-effective maritime policy for the RSA.
* Factors giving rise to the development of inhouse training institutions and the implications on future training for the RSA.
* The feasibility and implications of distance learning maritime education and training within the RSA.
* Revision of minimum admission requirements at maritime institutions and recruitment techniques of the shipowner, viz. marketing and public relations exercises.
* Feasibility of a national sea-going training vessel, e.g. design features, etc.
* Development of pre-sea training programmes and the policing of on-board training structures.

* Investigation into the high drop-out rate among South African seafarers.
* The implications and problems experienced by the fairer sex in a sea-going capacity.
* Investigation into the validity of existing SADOT syllabi, i.e. whether it meets current demands.
* Possible reasons for the low level of awareness among South Africans with regards to maritime related careers at sea and how this could be overcome.

7.5 CONCLUSION

The overall conclusion is that maritime education and training have been seriously neglected in the past, with the result that the present status quo, i.e. one of near chaos, prevails.

Factors such as:

* the foregone apartheid system in which the duplication of maritime facilities was entrenched, the dismal economic climate and
* the non-caring attitude of certain shipowners, viz. that seafarers are a necessary evil, played a contributary role in the imminent demise of the maritime industry.

However, despite the aforementioned factors, the RSA possesses the necessary expertise, infra-structure and manpower to overcome these obstacles against all odds.

Through collective brainstorming and negotiation the RSA has the capacity to become a world leader in the maritime field.

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Professor Captain C. Marcus (Head of Department: Bremen Polytechnic) to researcher, dated 5 June 1990.

Captain R. Stewart (Head: Dept. of Marine Transportation, U.S. Merchant Marine Academy) to researcher, dated 18 June 1990.

Captain H.F. Stohr (Head of Department: Maritime Studies, Cape Technikon) to Training Centre for Seamen, dated June, 1990.

Captain J.P.C. van der Westhuizen (Chief of the Navy: Vice-Admiral) to researcher, dated 29 October 1990.

Commander A.K.S. Hartley (Chief of the Navy: Vice-Admiral) to researcher, dated 26 August 1992.

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Captain K.M.T. Cox. Marine Consultant and part-time lecturer in Navigation Information Systems, Cape Technikon. Cape Town: 14 August 1990.

Captain W. R. Dernier. Principal Officer: South African Department of Transport, Shipping Directorate, Marine division. Held in Cape Town on 22 June 1992.

Captain A.S. Morris. Principal of the Training Centre for Seamen. Cape Town: June 1990.

Captain H.F. Stohr. Head of Department: Maritime Studies, Cape Technikon. Cape Town: 14 August 1990.

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11. PERSONNEL DEPARTMENTS CONTACTED

Cape Provincial Administration (Correctional Services)
De Beers Marine
Department of Environment Affairs
Pentow Marine
Portnet
Safmarine and
Unicorn

ANNEXURE A

QUESTIONNAIRE A

QUESTIONNAIRE TO STUDENTS WHO HAVE COMPLETED THE ELECTRONIC NAVIGATION SYSTEMS (ENS) - FISHERMAN COURSE

The undersigned is presently engaged in a research programme under the guidance of Dr P J Le Roux, via the Peninsula Technikon.

The objective of this research programme is to obtain data which would assist in identifying and possibly solving problems experienced by the ENS (Fisherman) course students, so that the course can be adapted accordingly.

It would be greatly appreciated if you could complete the attached questionnaire and return it at your earliest convenience in the stamped, self-addressed envelope provided.

All information received will be regarded as strictly confidential and will solely be used in its processed form for research purposes. Remember, your participation is of great importance and could certainly assist future students.

To ensure your anonymity, no provision is made for names or signatures. You are thus encouraged to voice your honest opinion.

Should you encounter any problems regarding the questionnaire, feel free to contact me at any time on the following telephone numbers (021) 21-6075 (office hours) or (021) 705-8161 (home).

DUE DATE: Kindly forward the completed questionnaire <u>before 30 April, 1992</u> to

Mr E D Snyders
18 Panton Road
FAIRWAYS
7800

THANK YOU FOR YOUR CO-OPERATION!

E D SNYDERS

Afrikaans op keersy

A. BIOGRAPHIC INFORMATION

Circle the appropriate number ↓

1. Present age in years?

17 - 21	1
22 - 40	2
41 - 60	3
61 and older	4

2. Sex?

Male	1
Female	2

3. School standard passed?

Lower than Standard 6	1
Standards 6 or 7	2
Standards 8, 9 or 10	3

4. Present Certificate of Competency held or equivalent?

Fisherman Grade 4	1
Fisherman Grade 3	2
Fisherman Grade 2	3
Fisherman Grade 1	4
Other	5

If 'other', specify which.
.....
.....

5. Year in which above certificate was obtained?

1963 - 1973	1
1974 - 1980	2
1981 - 1985	3
1986 - 1991	4

6. Any other non-maritime qualification?

Yes	1
No	2

If 'yes', specify which.
.....
.....

7. Cumulative sea-experience in years?

Less than 5	1
5 - 10	2
10 - 19	3
20 or more	4

8. Present rank?

Deck Cadet	1
Deckhand	2
Boatswain (Bosun)	3
2nd Mate	4
Chief Mate	5
Skipper	6
Other	7

If 'other', specify hereunder.
.....
.....

9. Category of fishing industry in which you serve?

Abalone (perlemoen)	1
Chokka	2
Combination	3
Crustacean (crayfish)	4
Demersal (Bottom)	5
Line-fishing (Longline)	6
Miscellaneous nets	7
Pelagic (Midwater)	8
Tuna	9
Other	10

If 'other', specify hereunder.

.....

.....

10. Marital Status

Divorced	1
Living together	2
Married	3
Single	4
Widowed	5

11. Place of birth
(If within RSA, state name of district. If outside RSA, state name of country only).

.....

.....

12. Country of citizenship

RSA	1
Other	2

If 'other', state name of country hereunder.

.....

.....

13. Language and Literacy
(You may choose more than one number where appropriate.

	Speak	Read	Write
English	1	2	3
Afrikaans	4	5	6
Portuguese	7	8	9
Black language	10	11	12
Eng/Afr dialect	13	N/A	N/A
Other	14	15	16

If a 'Black' or 'other' language, specify which one hereunder.

.....

.....

14. Monthly income (including fish commission and bonuses) in Rands.

1 - 499	1
500 - 999	2
1000 - 1499	3
1500 - 1999	4
2000 - 2999	5
3000 - 4999	6
5000 - 6999	7
7000 and above	8

15. Name of employer (If self-employed state 'self').

.....

.....

16. Particulars of residence during the ENS (Fisherman) course.

Flat (on same erf as house)	1
Flat (in flat building)	2
House	3
Hotel/hostel/boarding house	4
Town/cluster house	5
Other	6

If 'other', specify hereunder.

.....

.....

17. At the residence mentioned in (16) above, were the studying facilities adequate?

Yes/affirmative	1
No/negative	2

18. If (17) above is answered 'negatively', briefly mention the shortcomings.

.....

.....

.....

.....

19. Time taken to commute (travel) from residence in (16) above to the ENS (Fisherman) laboratory.

Less than 30 minutes	1
30 minutes to 1 hour	2
1 to 2 hours	3
More than 2 hours	4

20. Mode of transport from residence in (16) above to ENS (Fisherman) laboratory.

Company courtesy vehicle	1
Own	2
Lift club	3
Public transport (bus and/or train.	4

21. Were you in possession of a Certificate of Competency, prior to joining the ENS (Fisherman) course?

Yes	1
No	2

22. If your answer to (21) above is 'yes', state name of certificate held.

.....

.....

23. Was the ENS (Fisherman) course you attended your first?

Yes	1
No	2

24. If your answer to (23) above is 'no', mention year in which you attended the previous course. | 19..... |

B. POSSIBLE PROBLEMS EXPERIENCED BY THE ENS (FISHERMAN) COURSE STUDENTS AT SEA.

25. As a deckhand, were you exposed to the navigation equipment on the navigational bridge?

Yes	1
No	2
N/A (sailed as cadet or deck officer)	3

26. As a deck cadet, were you exposed to the navigation equipment on the navigational bridge?

Yes	1
No	2
N/A (sailed as deckhand or deck officer)	3

27. As deck officer, were you exposed to the navigation equipment on the navigational bridge?

Yes	1
No	2
N/A (sailed as deckhand or cadet)	3

28. Were you briefed on the operation of the various navigation equipment on the navigational bridge, prior to coming to college?

Yes	1
No	2

29. Were you allowed to utilise the navigation equipment for position fixing, under the guidance of a certificated officer as deckhand?

Yes	1
No	2
N/A (sailed as cadet or deck officer)	3

30. Were you allowed to utilise the navigation equipment for position fixing, under the guidance of a certificated officer as deck cadet?

Yes	1
No	2
N/A (sailed as deckhand or deck officer)	3

31. Were you allowed to utilise the navigation equipment for position fixing, under the guidance of the master as certificated officer?

Yes	1
No	2
N/A (sailed as deckhand or cadet)	3

C. POSSIBLE PROBLEMS EXPERIENCED BY THE ENS (FISHERMAN) COURSE STUDENTS AT COLLEGE (TRAINING CENTRE FOR SEAMEN).

32. In your opinion, was the 6 weeks allocated for the ENS (Fisherman) course insufficient?

Yes	1
No	2

33. If your answer had been 'Yes' in (32) above, state how many weeks in your opinion, should be allocated for the course.

.....
.....

34. Did you find the pace of the course too strenuous to cope with?

Yes	1
No	2

35. Were there too many modules, e.g. Radar, Decca, Echo sounder, etc. included in the course?

Yes	1
No	2

36. If your answer had been 'No' in (35) above, elaborate which additional modules should be incorporated in the course.

.....
.....
.....

37. Were the handouts (notes) given able to assist you in understanding concepts you had difficulty with?

Yes	1
No	2

38. Was the language used in the handouts (notes) simple enough for you to understand.

Yes	1
No	2

39. Did you find the language used by the lecturer, easy to understand?

Yes	1
No	2

40. If your answer had been 'No' in (39) above, briefly elaborate what you had difficulty with.

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.....

41. Did you have difficulty with the new technical terms you had to learn and understand?

Yes	1
No	2

42. Were lessons presented in a language of your choice?

Yes	1
No	2

43. If your answer in (42) above had been 'No', state which language you are more comfortable with.

.....

.....

44. Could you cope with the lecturer's pace during lessons, i.e. was the lesson progressing at too fast or slow a pace?

Too fast	1
Too slow	2
Satisfactory	3

45. During a lesson, did you feel free to raise a question on concepts you experienced problems with?

Yes	1
No	2

46. Were the problems {if there were any as mentioned in (45) above} resolved at the end of a lesson?

Yes	1
No	2

47. In your specific class group, did the students all have different ranks at sea, e.g. were there deck cadets, bosuns, mates and skippers in the same class group?

Yes	1
No	2

48. If your answer was 'Yes' in (47) above, did this fact at any stage during the course present a problem to you?

Yes	1
No	2

49. If you answered 'Yes' in (48) above elaborate on the problems you encountered.

.....

.....

.....

.....

.....

.....

50. Do you feel that there were too many theory tests during the course?

Yes	1
No	2

51. If your answer in (50) above was 'Yes', would you rather prefer one theoretical examination toward the end of the course?

Yes	1
No	2

52. If you reflect back on the ENS (Fisherman) course, was the experience meaningful, i.e. did you learn anything?

Yes	1
No	2

53. Do you feel that the present ENS (Fisherman) course should be updated on a regular basis?

Yes	1
No	2

54. If your answer in (53) was 'Yes', which period would you agree with?

Every 3 years	1
Every 5 years	2

55. Were there any other problems experienced by you in the ENS (Fisherman) course?

Yes	1
No	2

If yes, please specify hereunder.

.....
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.....
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.....

THANK YOU FOR YOUR VALUED CO-OPERATION!

ANNEXURE B

VRAELYS A

VRAELYS AAN STUDENTE WAT REEDS DIE KURSUS ELEKTRONIESE NAVIGASIESTELSELS (VISSERMANNE) VOLTOOI HET

Ondergetekende is tans besig met navorsing aan die Technikon Skiereiland, onder leiding van Dr P J Le Roux.

Die doel van hierdie navorsingsprogram is om die probleme wat studente met die ENS-kursus ervaar het te identifiseer en dit te probeer oplos deur veral die kursus aan te pas.

Dit sal waardeer word indien u asseblief die meegaande vraelys sal voltooi en so gou as moontlik terug besorg. Ingesluit is 'n gefrankeerde koevert vir hierdie doel.

Alle inligting wat verskaf word sal as streng vertroulik hanteer word en slegs vir navorsingsdoeleindes en in verwerkte vorm gebruik word. Onthou, u samewerking is belangrik en kan toekomstige studente steun.

U naam of handtekening word nie op die vraelys verlang nie, wat u anonimiteit verseker. Gee dus asseblief u eerlike mening.

Indien u enige probleme ondervind aangaande die vraelys, kan u die vrymoedigheid neem om my te skakel by tel. nr. (021) 21-6075 (kantoorure) of (021) 705-8161 (huis).

SPERDATUM: Stuur asseblief u voltooide vraelys voor 30 April 1992 aan

Mnr E D Snyders
Pantonweg 18
FAIRWAYS
7800

BAIE DANKIE VIR U SAMEWERKING!

.....
E D SNYDERS

English on reverse side

A. BIOGRAFIESE INLIGTING

Omkring die geskikste syfer ↓

1. Huidige ouderdom in jare?

17 - 21	1
22 - 40	2
41 - 60	3
61 en ouer	4

2. Geslag?

Manlik	1
Vroulik	2

3. Skoolstanderd geslaag?

Laer as Standerd 6	1
Standerds 6 of 7	2
Standerds 8, 9 of 10	3

4. Huidige bekwaamheidsertifikaat of gelykwaardige sertifikaat wat u oor beskik?

Visserman Graad 4	1
Visserman Graad 3	2
Visserman Graad 2	3
Visserman Graad 1	4
Ander	5

Indien 'ander', spesifiseer asb.
.....
.....

5. In watter jaar was die bogenoemde sertifikaat verkry?

1963 - 1973	1
1974 - 1980	2
1981 - 1985	3
1986 - 1991	4

6. Enige ander nie-maritieme kwalifikasie?

Ja	1
Nee	2

Indien 'ja', spesifiseer asb.
.....
.....

7. Kumulatiewe jare seevaart ondervinding?

Minder as 5	1
5 - 10	2
10 - 19	3
20 of meer	4

8. Huidige rang?

Dek-kadet	1
Dekseeman	2
Bootsman	3
2e Stuurman	4
Hoofstuurman	5
Skipper	6
Ander	7

Indien 'ander',spesifiseer asb.
.....
.....

9. Soort visbedryf waarin u huidig dien?

Perlemoen	1
Tjokka	2
Kombinasie	3
Skaaldiere (seekreef)	4
Bodemvis	5
Lynvis (Langlyn)	6
Allerlei nette	7
Pelagies (Buitesee)	8
Tuna	9
Ander	10

Indien 'ander', spesifiseer asb.
.....
.....

10. Huwelikstaat.

Geskei	1
Leef saam	2
Getroud	3
Enkel	4
Weduwee	5

11. Plek van geboorte.
(Indien binne RSA, noem distrik alleenlik. Indien buite RSA, noem land alleenlik).
.....
.....

12. Burgerskap.

RSA	1
Ander	2

Indien ander, noem land hieronder.
.....
.....

13. Taal en geletterdheid.
(U mag meer as een nommer kies waar toepaslik)

	Praat	Lees	Skryf
Engels	1	2	3
Afrikaans	4	5	6
Portugees	7	8	9
Swarttaal	10	11	12
Eng/Afr dialek	13	N/A	N/A
Ander	14	15	16

Indien 'Swart' of 'ander' taal, spesifiseer watter hieronder.
.....
.....

14. Maandelikse inkomste (insluitende viskommissie en bonusse) in Rand.

1 - 499	1
500 - 999	2
1000 - 1499	3
1500 - 1999	4
2000 - 2999	5
3000 - 4999	6
5000 - 6999	7
7000 en meer	8

15. Naam van werkgewer (Indien u eie onderneming meld 'self').

.....
.....

16. Besonderhede van verblyf gedurende die ENS (Visserman) kursus

Woonstel (op erf van huis)	1
Woonstel (Woonstelblok)	2
Huis	3
Hotel/koshuis/losieshuis	4
Tros/skakelbehuising	5
Ander	6

Indien 'ander', spesifiseer.

.....
.....

17. By die woning genoem in (16), was die studiefasiliteite voldoende?

Ja/bevestigend	1
Nee/negatief	2

18. As (17) 'negatief' beantwoord was, verwys kortliks na die tekortkominge.

.....
.....
.....
.....

19. Noem die hoeveelheid tyd wat in beslag geneem is, om vanaf die woning in (16) na die ENS (Visserman) laboratorium te pendel (reis).

Minder as 30 minute	1
30 minute tot 1 uur	2
1 tot 2 uur	3
Meer as 2 uur	4

20. Vorm van vervoer om vanaf die woning in (16), na die ENS (Visserman) laboratorium te reis.

Maatskappy se gunsmotor	1
Eie	2
Geleentheidklub	3
Publieke vervoer (bus en/of trein.	4

21. Was u in besit van'n Bekwaamheids-sertifikaat voordat u die ENS (Visserman) kursus bygewoon het?

Ja	1
Nee	2

22. Indien u antwoord in (21) 'ja' was, meld naam van sertifikaat.

.....
.....

23. Was dit u eerste ENS (Visserman) kursus wat ubygewoon het?

Ja	1
Nee	2

24. Indien u antwoord in (23) 'nee' is, noem die jaar waarin u die vorige kursus bygewoon het? | 19..... |

B. MOONTLIKE PROBLEME WAT ONDERVIND IS DEUR ENS (VISSERMAN) STUDENTE TER SEE

25. As dekseeman, was u blootgestel aan die navigasie toerusting op die navigasiebrug?

Ja	1
Nee	2
N.V.T. (Het as kadet of dekoffisier geseil).	3

26. As 'n dekkadet, was u blootgestel aan die navigasie toerusting op die navigasiebrug?

Ja	1
Nee	2
N.V.T. (Het as dekseeman of dekoffisier geseil).	3

27. As dekoffisier, was u blootgestel aan die navigasie toerusting op die navigasiebrug?

Ja	1
Nee	2
N.V.T. (Het as dekseeman of kadet geseil).	3

28. Het u voorligting ontvang in die gebruik van die verskeie navigasie toestelle, voordat u die kollege bygewoon het?

Ja	1
Nee	2

29. Was u bevoorreg as dekseeman om die verskeie navigasie toestelle vir posisie bevestiging, onder leiding van 'n gesertifiseerde offisier, te gebruik?

Ja	1
Nee	2
N.V.T. (Het as kadet of dekoffisier geseil).	3

30. Was u bevoorreg as kadet om die verskeie navigasie toestelle vir posisie bevestiging, onder leiding van 'n gesertifiseerde offisier, te gebruik?

Ja	1
Nee	2
N.V.T. (Het as dekseeman of offisier geseil).	3

31. Was u bevoorreg as gesertifiseerde offisier om die verskeie navigasie toestelle vir posisie bevestiging onder leiding van die gesagvoerder te kan gebruik.

Ja	1
Nee	2
N.V.T. (Het as dekseeman of kadet geseil).	3

C. MOONTLIKE PROBLEME ONDERVIND OP KOLLEGE (OPLEIDINGSENTRUM VIR SEELUI) DEUR ENS (VISSERMAN) KURSUS STUDENTE.

32. Volgens u mening, was die 6 weke aangewys vir die ENS (Visserman) kursus onvoldoende?

Ja	1
Nee	2

33. Indien u antwoord in (32) 'ja' was meld, volgens u mening, die hoeveelheid weke wat vir die kursus aangewys moet word.

.....
.....

34. Het u die tempo van die kursus te veeleisend gevind om by te hou?

Ja	1
Nee	2

35. Was daar te veel modules, b.v. Radar, Decca, Eggolood, ens., by die kursus ingesluit?

Ja	1
Nee	2

36. Indien u antwoord in (35) 'nee' was, meld watter bykomende modules by die kursus ingesluit moet word.

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37. Was die notas uitgehandig in staat om u te help met begrippe waarmee u probleme gevind het?

Ja	1
Nee	2

38. Was die taalgebruik in die notas eenvoudig genoeg om te kan verstaan?

Ja	1
Nee	2

39. Was die taalgebruik van die dosent eenvoudig genoeg om te verstaan?

Ja	1
Nee	2

40. Indien u antwoord in (39) 'nee' was, meld kortliks waarmee u moeilikhede gehad het.

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41. Het u moeilikheid ervaar met die nuwe tegniese terme wat u moes aanleer en verstaan.

Ja	1
Nee	2

42. Was die lesse in 'n taal van u keuse aangebied?

Ja	1
Nee	2

43. Indien u antwoord in (42) 'nee' was, meld die taal waarmee u gemaklik is.

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44. Kon u gedurende lesse byhou met die dosent se tempo, d.w.s. was die les se verloop te vinnig of te stadig?

Te vinnig	1
Te stadig	2
Voldoende	3

45. Gedurende 'n les, het u vry gevoel om vrae te vra oor begrippe waarmee u probleme gehad het?

Ja	1
Nee	2

46. Was hierdie probleme in (45) opgelos voor die einde van die les?

Ja	1
Nee	2

47. In u spesifieke klasgroep, was die rang van die studente verskillend, bv. was daar dekkadette, bootsmanne, stuurmanne en skippers in dieselfde klasgroep?

Ja	1
Nee	2

48. Indien u antwoord in (47) 'ja' was, het hierdie feit in enige stadium vir u probleme besorg?

Ja	1
Nee	2

49. Indien u antwoord in (48) 'ja' was, wei uit oor die probleme wat u ondervind het.

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50. Voel u dat daar te veel teoretiese toetse gedurende die kursus was?

Ja	1
Nee	2

51. Indien u antwoord in (50) 'ja' was, sou u liewer een teoretiese eksamen na aan die einde van die kursus verkies?

Ja	1
Nee	2

52. Wanneer u besin oor die ENS (Visserman) kursus, sou u sê dat die ondervinding betekenisvol was, d.i. het u iets geleer?

Ja	1
Nee	2

53. Voel u dat die huidige ENS (Visserman) kursus op 'n gereelde basis herhaal moet word?

Ja	1
Nee	2

54. Indien u antwoord in (53) 'ja' was, oor watter termyn sou u saamstem?

Elke 3 jaar	1
Elke 5 jaar	2

55. Het u enige ander probleme met die ENS (Visserman) kursus ervaar?

Ja	1
Nee	2

Indien 'ja', spesifiseer asb.

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BAIE DANKIE VIR U GEWAARDEERDE SAMEWERKING!