IDENTIFYING THE TRAINING NEEDS FOR CANADA'S MARINE INDUSTRY THAT MAY BE MET BY A MARINE SHIP HANDLING SIMULATOR

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by

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ABSTRACT.

This study was concerned with obtaining the opinions of Canadian mariners as to the appropriate training which may be offered through the use of the new ship handling simulator facility established in St. John's Newfoundland. In 1987 funding was approved through the Canada-Newfoundland Offshore Development agreement for an advanced ship handling simulator facility to train Canadian mariners and to enhance safety at sea.

A questionnaire was distributed to Canadian mariners seeking their opinions as to the training needs. One hundred and twenty-seven questionnaires were distributed to mariners by the researcher and forty-two questionnaires were delivered to marine colleges, Canadian Coast Guard centres and shipping companies for further unresticted distribution, two hundred and one questionnaires were returned. The study identified five sectors of the marine industry as distinct and asked respondents to associate with one of these sectors which were Great Lake shipping, Fishing, Oil exploration, Coastal shipping (ferries etc.) and General shipping (including Coast Guard). The questionnaire was limited to those mariners who had attended a radar simulator course, this was achieved by restricting the distribution to those with a minimum certification level.

The questionnaire addressed training needs established through informal discussions with Canadian mariners in addition to the review of training being offered,at the time of the survey, at ship handling simulator facilities in other countries. The sections on the questionnaire were ship

handling, navigation, emergencies, bridge team work, offshore petroleum, fishing, navigation in ice and specialized tasks. In addition, respondents were offered the opportunity to submit related comments.

Respondents were asked to complete all sections of the questionnaire making the assumption that the required technology of the ship handling simulator would facilitate such training. From the analysis of the data the high number of undecided responses indicated either a lack of knowledge in the specific sections of the questionnaire such as fishing and ice navigation or a limited concept of ship handling simulation. The majority of questions received support as being appropriate training for Canadian mariners. Those questions which indicated some doubt were further analyzed by the sector represented, role within the industry and familiarity with ship handling simulators. Of the total respondents to the questionnaire over fifty percent had attended a course or visited a ship handling simulator facility.

The specific content for training programs has been clearly established, in addition Canadian mariners indicated that such training should be made available to all sectors of the industry and that training on a ship handling simulator must be complementary too and not a substitute for ship board experience.

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Finally, the most important acknowledgment of thanks is reserved for my wife and family, who have discovered the true definition of patience.

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CHAPTER 1

INTRODUCTION

On July 17, 1987 the then Right Honourable John Crosbie, Federal Minister of Transportation, announced the approval of the Marine Offshore Simulator Training and Research Centre (M.O.S.T.R.C.) to be funded under the Canada-Newfoundland Offshore Development Fund. In announcing the approval, the Minister brought to a close a two year process directed at bringing to Canada a marine ship handling simulator. This facility is unique in Canada and joins a small group of similar facilities around the world. Internationally, the M.O.S.T.R.C. (now renamed the Centre of Marine Simulation) is unique in many ways, offering Canadian mariners training on a totally multi-integrated ship handling simulator with the potential of training in newer areas of fisheries and ice navigation

Marine transportation education and its associated curriculum have limited documentation when compared to other major transportation disciplines. The marine environment is relatively traditional and often adverse to change, yet new technology and economics are formidable catalysts, which even tradition cannot elude. Twenty-first century technology is advanced, highly demanding, and has the potential to offer Newfoundlanders and Labradorians, along with all other Canadian mariners, enhanced training to meet the needs of the marine industry.

1. Ship Handling Simulator

The purpose of a ship handling simulator is to provide a ship model, capable of operating in pre-selected areas of open sea, coastal or restricted waters with accurate data bases for visuals, coastlines, fairways and buoyed channels. The simulator obeys the manoeuvring commands given by a trainee during an exercise. Visual effects are provided within and from the ship's navigation bridge to reproduce a "real life" display. These visual effects include coastline, navigation marks, and other shapes under dusk, night or daylight conditions as well as in varying visibility conditions such as fog. Through the use of vibration and audio devices the environment of a ship bridge is simulated. To create roll and pitch movements the simulator is mounted on a dynamic manoeuvrable platform.

The simulation allows freedom of manoeuvrability within a variety of geographic areas. Detailed mathematical models of marine vessels and external environmental forces that will act on the vessel allow for specific ship manoeuvring such as berthing and anchoring of the vessel, heavy weather ship handling and collision avoidance.

The simulator consists of a central computer and a fully equipped wheelhouse with a complete array of working vessel controls. The simulator may be augmented with a standard navigation simulator having four ownships and the capability for visual presentation.

It has been acknowledged that simulator training, albeit computer based learning, is not to be confused with programmed learning. In this instance simulator training is integrated learning, using traditional lectures, seminars and related textbooks exercises. As such it is an educational

environment that provides direct contact with experienced teachers to enhance the learning process. Ships' officers utilized in the simulator training require knowledge of fundamental and applied sciences such as navigation, manoeuvring ship controls, mathematics, stability, and radio technology. To enhance his/her professionalism, the ships' officer must be familiar with local, national and international marine related rules, regulations and laws. Consequently understanding of the operating principles of a vessel are essential as are the many leadership skills necessary for the commander of a ship.

An important reason for the acquisition of the ship handling simulator had to do with offshore development of the oil industry. The simulator enables the trainees to learn the inherent duties of ships officers and the handling characteristics of vessels. Ship handling simulators have been in use, and their value recognized, for many years in other parts of the world. However, with the development of more technically sophisticated vessels, and an increase in the consequences of an error in judgement, there has been a growing realization that simulator training is a most important factor in ensuring the safety of an operation and in protecting the environment. This is particularly important for offshore drilling units, offshore vessels, and oil and natural gas tankers operating in the northwest Atlantic.

Offshore Target Group

The objective of the ship handling simulation training program is to provide a higher degree of training for masters and mates on offshore support vessels, mobile offshore drilling units, barges, pipelayers, crane-barges, tankers and other units associated with offshore development and production.

Ship handling is particularly important for such specific activities as manoeuvring close to a mobile offshore drilling unit or to a single point mooring, or towing out and placing a bottom-founded or floating structure. However, similar training may benefit all other relevant groups working in marine related industries.

Impact on Long Term Offshore Employment

Overall use of the ship handling simulator at the Marine Institute can enable trainees to better acquire a the level of training required by the offshore petroleum industry, both in Canada and in other location in the world. Furthermore, the training acquired from use of the simulator can enhance the opportunity of these persons to attain higher positions within the management and crew structures of those companies working in the offshore field.

2. Institute of Fisheries and Marine Technology

The Institute of Fisheries and Marine Technology replaced the older College of Fisheries in June, 1985. The Marine Institute Act (December 1984) was subsequently replaced by Bill 12 in June, 1987. The Institute consists of three campuses: the main campus in St. John's, Newfoundland, the Marine Emergency Duties Centre at Foxtrap, and the training vessel and lifesaving centre situated on the southside in St. John's. The mandate of the Institute is to offer programmes in fisheries technology, marine transportation, and engineering and marine technology.

The Mission of the Marine Institute

The mission of the Marine Institute is to foster an environment for enhancing economic development in strategic marine sectors, to enable Newfoundlanders and Labradorians to participate nationally and internationally and to assist in the development and marketing of Newfoundland's marine technology.

Goals of the Marine Institute

Amongst the goals of the Marine Institute are to seek recognition as an international centre of excellence, to be designated as a nautical centre for marine transportation and to establish a world class safety and survival centre. In addition the Marine Institute seeks to establish a nautical centre in simulation training and applied research, upgrade Canadian Certificates of Competency and develop linkages with Canadian industry.

CHAPTER 2

THE PROBLEM

1. *Introduction*

International regulations for safety at sea have produced a new impetus in nautical training. Traditional training for marine navigators and mariners in general is a combination of practical periods at sea and theoretical educational studies ashore. Facilities in the form of training vessels that allow trainees to acquire the practical and theoretical knowledge and skills are viewed as unrealistic training programs and an economic burden on the marine industry. The traditional training process throughout the careers of ships officers relies on 'on the job ' training to acquire the necessary practical skills. As traffic density at sea continues to increase, vessels become faster, larger, more technical and complicated; the financial responsibilities of ship personnel continue to escalate resulting in increased physical and mental demands on marine trainees. The consequences of accidents at sea is serious, both for those aboard ships and for the environment in general. National and international regulations demand higher levels of training for those who have the responsibility for sea transportation.

The training of mariners is aimed at ensuring that individuals who command ships on the world's waters do so as highly skilled, well trained crews, working together within established and practiced procedures and having at their disposal all the skills and equipment necessary for safe sailing.

The most useful form of training was believed to be 'on the job' training. However, the efficiency of such training may not be as high as expected due largely to the fact that the appearance of critical events may not always be predicted. To address this dilemma sophisticated navigation and ship handling simulators have been developed. Radar trainers were early examples;

> During the preceding years shipping has undergone a technological revolution. Ships now have highly complex and sophisticated machinery. . . And yet, every year nearly 200 (larger) ships, grossing well over a million tons, are lost through accidents at sea. An even greater number of ships are severely damaged. . . Many of these accidents involve serious injury and even tragic loss of life to seafarers. . . There is a very strong reason to believe that such accidents can be avoided, not so much by the provision of even more machinery or equipment or by the adoption of new regulations as by enhanced attention to the human elements onboard vessels the seafarers, attention to their professional training and welfare in order to equip them better to meet the exacting requirements of today's shipping and navigation.[1]

By 1980, numerous facilities existed around the world offering navigation, radar and collision avoidance training. More recently the introduction of ship handling simulators into the training process allows mariners to extend and expand their knowledge and skills.

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[1]S.P. Srivastva, "World Maritime Day 1980 Maritime Training for Safer Shipping and Cleaner Oceans." A Intergovernmental Maritime Consultative Organization (I.M.C.O.) circular letter sent to all IMCO's member governments by the Secretary General June, 1980.

The potential of ship handling/ship bridge simulators as a training device to upgrade and ensure high marine standards has become increasingly recognized. Both shipping companies and legislative authorities have become increasingly aware of the potential for training seafarers using ship handling simulators. Simulated training is not viewed as training per se, but it is rather the providing of experiences through simulation.

A discussion paper on the ship handling simulator was written in January 1985 by the Department of Nautical Science at the Marine Institute (Appendix 2). Identified within this paper were general objectives, training objectives and training uses for the ship handling simulator. The discussion paper was more an instrument in the process of acquiring a ship handling simulator facility; consequently, it contained many generalities. However, the paper exposed the concern that training for the marine environment must also include offshore marine training, ice navigation training and fishing related marine training. Each of these areas are commonly bound by certain skills and environmental conditions. Similarly these areas have very specific and unique needs applying to their disciplines. The training needs of ice navigation and fishing navigation are synonymous with offshore training needs. The need for training of offshore marine personnel through the use of a ship handling simulator was supported by the Canada-Newfoundland Offshore Development Fund.

> It may well be agreed that synonymous with offshore training needs are the training needs of ice navigation and fishing navigation. There are several steps to be undertaken in the acquisition of a (ship handling) simulator which will effectively meet the functions and cost requirements of the user. The first, and most important step is to define the functional objectives. What is the simulator to be used for?[2]

The problem which remains is to identify the training specifics that may be met by such a facility. The marine environment offers complex challenges to Canada's continually developing marine related industries. Success of industrial expectations is largely dependent on the quality of the marine crews and the training such crews receive. The absence of design for ice navigation and fishing technology capabilities within Phase I of the simulator facility does not detract from the necessity to identify the training needs of the Canadian maritime industry.

2. Purpose of the Study

The purpose of this study is to identify the training elements which may be offered on a ship handling simulator to best meet the needs of the marine industry of Newfoundland and the rest of Canada.

3. Research Questions

The study addresses five questions associated with the Canadian marine industry.

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[2]J. Puglisi, "Users Guide for Simulator Development/Acquisition", paper presented at the International Marine Simulator Forum New York, June 1986, revised paper circulated to membership May 2nd, 1986.

1. What general training needs will a ship handling simulator appropriately meet with respect to ship handling, navigation, marine emergencies and bridge team work?
2. What training needs will a ship handling simulator appropriately meet with respect to Canada's offshore petroleum industry?
3. What training needs will a ship handling simulator appropriately meet with respect to Canada's fishing industry?
4. What training needs will a ship handling simulator appropriately meet with respect to navigating in ice?
5. What other specialized training may a ship handling simulator offer?

4. Significance of the Study

The facility in St John's is Canada's first major ship handling simulator. The significance of the study is that it has ascertained views of what may be considered training elements for the ship handling simulator by abstracting views of experienced mariners. This study identifies the training needs that such a ship handling facility will meet for the Canadian marine industry.

5. Delimitation's of the Study

The following factors are acknowledged as delimitation's in the study:

1. The study was delimited to marine training and education using ship handling simulators.
2. Research and development aspects of a ship handling simulator were not included in the study.

3. The study was delimited to identifying the training needs of the commercial sectors of the marine industry.
4. The study sought the opinions of mariners with respect to training on a ship handling simulator.

6. Limitations of the Study

A number of limitations are inherent in a study of this nature as the volume of marine education is vast and diverse. Similarly, the population of mariners is not only vast, but fluctuates greatly because of seasonal and economic factors and as a consequence is difficult to identify at any given moment in time. The following were, therefore, recognized as imposing limits on the generalizing of the results to the total population.

1. The study is limited in that the participants were not a controlled random sample from the population.
2. No attempt was made to achieve proportionate representation from the sectors within the industry.
3. The participants were asked to express their opinions, hence subjectivity is present.

In spite of these above limitations, however, and because the study has a focus on identifying the training elements required for the use in simulator training, the limitations are not believed to be of a direct consequence to the findings of the study.

CHAPTER 3

RELATED LITERATURE

1. Introduction

Ship handling simulators have been available since the mid 1960s in a variety of forms with a wide range of uses divided between training and research. Simulators are complex and costly; therefore, their numbers are relatively small, and distributed at the larger marine centres in the world.

The related literature referenced to marine training using ship handling simulators will be presented under three sections: (1) information supplied by manufacturers concerning the training for which their equipment can be used, (2) information about training programs currently offered on ship handling simulators by a selected number of international institutions, and (3) a review of related lierature dealing with ship handling simulator training.

The emphasis in modern day shipping is towards more cost effective fleets. Ship operators are today facing unprecedented problems in providing adequate training for their personnel. Ships are more sophisticated, training requirements are more stringent, yet resources, in terms of training personnel and adequate funds are being continually reduced. Those responsible for specifying and designing training are in a difficult position as training must be enhanced in an environment of economic restraint.

Reeves in a study on ship simulation indicated that:

> The critical measure of the validity and fidelity of skills training and problem solving on ship simulation installations is the degree to which learned performance is retained and transferred positively and safety to sea . . . . there are no defensible shortcuts to using ship simulation facilities for solving maritime problems and achieving effective training.[1]

2. Manufacturers and Suppliers of Ship Handling Simulators

The manufacturers and suppliers of ship handling simulators suggest their simulators may be used in a number of ways for marine training. The contents of brochures which describe simulator products available from several companies report a general emphasis on the training. There is no intention to suggest preference for any particular supplier, nor is the list of suppliers complete.

Maritime Dynamics Ltd.

Maritime Dynamics Ltd., a manufacturer of ship handling simulators, is located in Phoenix, Arizona. They state that the offshore marine industry is concerned above all with ship operations in close quarters and in poor weather conditions. They claim that the flexibility and modular design of their simulator, coupled with the ability to mount users' own ship mathematical models and port designs, gives the simulator a very wide range of potential training uses. Suggested training uses include ship handling at

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[1]P.E. Reeves, "Mariner Skills Transfer by Simulation" Transimare (c), Vol. 99, Conf. 1. Paper B2 1984.

close quarters and stern view approaches together with ship familiarization. Maritime Dynamics engineers observe that a simulator may be used for navigational and safety training for the officer of the watch in bridge procedures, emergency procedures and in use of bridge equipment.

VFW-Fokker

VFW-Fokker of Bremen, Germany, a manufacturer of a range of successful short and medium range haul aircraft, ranks among the leading aerospace companies of the world. This background provides a basis for the development of various transportation simulators which include the ship handling simulator. This manufacturer suggests areas of training should include ship handling, familiarization of various vessel types, manoeuvring and navigation under real ship environmental conditions and pilotage training.

Racal Decca

Racal Decca developed and installed the first British ship handling simulator at the College of Nautical Studies in Warsash, England in 1977. Racal SMS (formally Racal Decca) is one of five companies which form the Racal Marine Ltd. group. This group claims to draw together world acknowledged expertise in marine disciplines of navigation, radar, marine control, marine simulation and service. The purpose of their simulators is to satisfy the requirements for versatile training systems and programs. Racal engineers suggest simulator training in ship handling and navigation. They recommend this training for all officers, and indicate that the training programs should simulate open sea conditions as well as restricted waterways under various visibility conditions. An addition training program in bridge organizational procedures is also suggested by the Racal engineers. They

suggest that this additional training may be met by the use of less sophisticated simulators, however if it were part of a larger program it would be readily adapted to training on a ship handling simulator.

Marconi Radar Systems Ltd.

Marconi Radar Systems Ltd. of Leicester, England was established in 1971 and specializes in advanced electronic systems designs. Marconi engineers claim the purpose of a ship handling simulator is to provide training appropriate to a variety of ship types and in scenarios, in which ships function with a high degree of realism in both content and surrounding for ships officers and pilots. Training for ship handling and navigation in harbour approaches, water ways and open seas is complemented with training in electronic navigational instrumentation and radio communications. They also suggest that in utilizing a simulator for training, programs should include procedural training for emergencies and bridge operation as well as with training in the use of ship control and vessel familiarization.

Krupp Atlas

Krupp Atlas of Bremen, Germany is a major manufacturer of ship handling simulators and radar simulators. As well they have been long established manufacturer of military and marine electronic systems. Krupp engineers suggest that their simulator has many applications in the training of mariners. These applications include training for professional and academic qualifications as well as being a tool for refresher training for qualified seamen. They suggest a simulator facilitates the education of mariners to appreciate the physical forces involved in vessel motion and ship handling.

Seagull A/S

Seagull A/S of Horten, Norway was founded in 1978 by a group of engineers who offer a depth of experience in the fields of applied computer technology, systems innovation and design. Their activities related to the development and production of marine simulators and trainers is a basis for diversification and growth of this company. Seagull simulators permit training in navigation, ship handling and manoeuvring. Basic training includes equipment familiarization, vessel manoeuvring, position fixing and radar operation. More advanced training covers integrated operations and complex ship handling and navigation and the evaluation of how the different operational conditions affect the performance of vessels and equipment.

C. Plath

C. Plath is a German company located in Hamburg. Founded in 1837, C. Plath represent a technology-based company providing advanced electronic navigation and ship control systems, reflecting experience in the project management for combined computer hardware and software systems. As recently as 1985, C. Plath entered the simulation market place and operated in close cooperation with the Danish Maritime Institute. Their jointly offered simulator is acknowledged as offering a wide range of training provisions. In their literature C.Plath engineers suggest that marine and navy personnel training may use their system for ship handling, manoeuvring and collision avoidance. An existing simulator of this manufacturer is presently being used by the Copenhagen School of Navigation to train navigators and pilots.

Summary

Marine training, utilizing ship handling simulators, will vary according to the specific needs of the industry being serviced and the capabilities of the training facility. Therefore for the manufacturers of simulators to identify a finite list of training uses would be inappropriate. A close inspection however, shows that there are three common areas of training that are consistently identified. These are training in ship handling, navigation and collision avoidance.

3. Training provided by Educational Institutions with Ship Handling Simulators

There are presently a number of educational institutions in various locations throughout the world using ship handling simulators in their training programs. Calendars and other related materials from six of these institutions are reviewed in this study.

Arctec Canada Ltd.

Arctec Canada Ltd. of Ontario has achieved an international reputation for their expertise in ice engineering and cold ocean technology. More recently Arctec has expanded to provide advanced problem solving capabilities in support of a wide variety of marine transportation and offshore problems. Arctec commissioned Canada's first Bridge Navigation Simulator in 1987. It offered full scale bridge controls, and computer generated graphic projection of bridge views, and a basis for an ice navigation simulator. Arctec offers the simulator for training new mariners on handling different types of ships, rules for avoiding collision at sea, bridge procedures and helmsmanship. Also the simulator offers training provisions that allow

experienced officers and captains to practice handling a ship in various emergency situations. The current simulator has a nocturnal display and is suitable for nocturnal navigational training only.

Australian Maritime College

The Australian Maritime College (A.M.C.) is located in Launceston, Tasmania. As the national Australian maritime college, it provides maritime and marine related courses at various levels, including degree and post graduate studies. A.M.C. claims that their simulator is one of the world's most advanced commercial ship handling simulators. Their new facilities offers training in passage planning, navigation, ship handling and pilotage training. More specifically the training and assessment of deck officers conducted at A.M.C. is related to bridge organization and passage planning as well as emergency procedures under failure conditions. Their ship handling training for ships masters is associated with navigation in restricted waters, manoeuvring, mooring and berthing with the use of tugs.

Marine Safety International

Marine Safety International (M.S.I.) is located at New York's LaGuardia airport where it has provided professional training to ship's deck officers and engineering officers since 1976. M.S.I. courses are aimed at improving judgement by providing experience in handling high risk situations. Training exercises at M.S.I. are conducted using a variety of simulated geographic situations such as coastal approaches, harbours, straits, rivers, canals, turning basins and docks. The major training programs at M.S.I. are focused on ship handling, pilotage and bridge team management. Canada's Dominion Marine Association (D.M.A.) designed special training programs

for their masters and chief mates for use on the M.S.I. simulator. These programs specialize on the most difficult portion of the St. Lawrence Seaway.

College of Maritime Studies

The College of Maritime Studies (C.M.S.) is located in Warsash, England and operates two ship handling simulators as well as the traditional navigation and engine room simulators. The first marine simulator was operational in 1976 with the second simulator coming on line in 1981. C.M.S. offers several simulator based training courses ranging from a few days to two weeks in duration. The courses offer training in bridge organization and team work, emergency procedures, bridge watching keeping preparation and advanced ship pilotage. The general emphasis is on ship handling, navigation and bridge watchkeeping practices and procedures. A wide variety of training is offered candidates that range from new entry cadets to experienced ship masters.

Marine Training and Research Centre

The Marine Training and Research Centre (M.T.R.C.) in Toledo combines area facilities to represent one of North America's largest centres of marine training. The simulation is modular in design allowing for a broad range of training applications. The training courses offered at M.T.R.C. are designed to meet specific training needs. Training courses at M.T.R.C. offer training in collision avoidance, radar plotting and navigation, ship handling and bridge/team organization.

Seafarers Harry Luneberg School of Seamanship

The Seafarers Harry Luneberg School of Seamanship (S.H.L.S.S.) in Connecticut, U.S.A. offers training programs at all levels for marine

certification. The ship handling simulator was commissioned in 1986. and is an integral component of training programs at the school. Course content for training programs utilizing the ship handling simulator includes training in ship manoeuvring, waterway transits, port approaches, navigation, and collision avoidance practice.

Summary

The review of training programs was based largely upon data from college brochures and calendars. Consequently references are not detailed descriptions. Nevertheless, common training practices in the programs are evident. There is evidence that emphasis is placed on training in ship handling and navigation as well as bridge team management and pilotage.

4. Literature Dealing with Marine Training Using Ship Handling Simulators

Literature related to training and ship handling simulators is extensive. The emphasis is mainly related to the credibility and rationality of simulation training. There is a scarcity of literature related to identifying what training needs may be addressed utilizing ship handling simulators. The research review is from a wide variety of sources that include government funded projects and research that support purchase tender specifications.

A Sea Cadet Training Program Study

A comparative study of two programs for sea cadet training conducted in Warsash, England and King's Point, New York was carried out by the Computer Aided Operations Research Facility (C.A.O.R.F.)[2]. This research put instructor differences and techniques as controlled variables in a study of variations in the two ship handling simulator procedures. Retention

of simulator-based training and the identification of the critical components in the training of maritime cadets using simulator-based training was sought. The transfer of learned skills from simulator-based training to the real world were also assessed using controlled and non controlled group. The behaviours and skills associated with basic bridge procedural practices such as watch relief, watch standing, navigational support and the following of given orders were monitored. The study focused on relevance of training, and the effectiveness of conducting such training using ship handling simulators. The results provided data to amend course objective and skill tasks for each program. However, there were no indications to how the training objectives were initially identified or subsequently validified. What became apparent in this and many of the research papers and studies related to ship handling simulators was the instructional practices and training needs are often taken for granted and still assumed to be relevant.

Acquiring a Ship Handling Simulator for Training in Finland

Prior to acquiring a ship handling simulator for training in Finland a preliminary specifications document was published in 1981 by the Technical Research Centre of Finland. Included in this document were a list of the training objectives for the proposed centre. Following the acquisition of the simulator a report was published by the Research Centre that described the

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[2]Computer Aided Operations Research Facility. (C.A.O.R.F.), "A Comparative Analysis of Ship handling Simulator-Based Training Programs Conducted by the College of Nautical Studies, Warsash, England, and by the United States Merchant Marine Academy, Kings Point, New York", 1985.

selection procedure and process. The Haapio[3] report reviewed the initial requirements and analysed the system that was selected. The chosen system was required to meet two main objectives: training and research. It recommends that all ranks of deck officers from cadets to masters and pilots should benefit from basic, advanced and follow up training on simulators. The various levels of training were to consist of; ship handling, navigation, rule of the road, emergency situations, handling capabilities of different ship types, piloting, environmental effects on ship manoeuvring, anchoring and mooring, restricted navigation and passage planning. These general training requirements would receive relative emphasis dependent on the course and experience of the trainees.

It is apparent that although these training areas are very applicable to the marine environment as a whole, they are very general and do not reflect the specific training needs for the various sectors of the marine industry.

Ship Handling Design for Nautical Schools

In an address to the International Marine Simulator Forum June 1987, Dr. Hamnell and Captain Motte[4] identified potential levels of training effectiveness with the use of marine simulation. The three interacting factors identified were academy training objectives and needs, simulation technology and cost. Their address generally focused on the issues surrounding the acquisition and use of a ship bridge simulator, training needs, configuration of training and cost.

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[3]A. Haapio and M. Heikkila, A Ship Handling Simulator for Training and Research (Technical Research Centre of Finland.) 1985.

[4]J. Hammell and G. Motte, "Ship handling Simulator design for Nautical Schools." International Marine Simulator Forum 1987,p 203-216.

> Training objectives and needs comprise one side of the equation; cost is the other. Simulation technology is the mediating factor, trading off between cost and effectiveness.[4]

When addressing the area of training needs Hammell and Motte claimed that changing marine technology and increased demands may require advanced training; however,

> finding that a ship bridge simulation is an effective medium for training cadets is insufficient justification for purchase/use of a simulator . . . this must be addressed with regard to changes in the marine industry and their impact on training needs[4]

Their paper identifies the courses to be used on the ship bridge simulator at the Massachusetts Maritime Academy to meet specific military cadet training objectives as shown below. They conclude that although the ship handling simulator is an effective means to conduct the training, there are equally cost effective alternatives available .

Course	Simulator Application
1. Piloting I	watchkeeping practice helm and engine orders
2. Rules of the Road	ship and light recognition steering and sailing rules
3. Piloting I	coastal navigation practice
4. Radar Observer I	bridge procedures\radar\visual
5. Radar Observer II	bridge team concepts\radar practices
6. Navigation II	electronic aid application
7. Seamanship II	ship handling, emergency situation and watch standing procedures.

In summary, Hammell and Motte indicated that marine training institutions have unique training needs and ship bridge simulators are cost effective tools only when they are use to meet those needs.

Canadian Marine Transportation Project

Elliott[5] in his paper, reviewed Arctic training and safety. In referring to Masters and Mates training Elliott observed;

> At present, opportunities for ice navigation training in Canada are relatively limited. For the most part, bridge watch keepers learn their craft through first-hand observation of a senior officer's responses to various ice conditions, or through a more dangerous ritual of learning by doing . . .

The 1978 International Convention on Standards of Training Certification and Watch keeping for Seafarers (of which Canada is a signatory) outlines the minimum knowledge required for certification of masters and chief mates of ships of 200 gross register tons or more. It requires, specifically, that navigators acquire skills in voyage planning and navigation for all conditions, including ice, and manoeuvring and handling of a ship in all conditions, including practical measures to be taken when navigating in ice or conditions of ice accumulation on board. These rather broad requirements may be translated into topics for specific modules of instruction and training using a ship handling simulator. Such topics may include; Arctic navigational

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[5]W. Elliott, "Arctic Shipping; An Assessment of Crew Recruitment, Training and Quality of Working Life Issues." Report No. 14 Transport University Programs, Strategic Policy Directorate, Transport Canada 1985/6.

equipment, limitation of charts, ice interpretation and identification, navigational route selection, vessel handling characteristics and manoeuvrability in ice, Arctic search and rescue.

Technology and Manning for Safe Ship Operation

A British merchant service review into the personnel requirements for their merchant fleet in the 1990's was completed in 1986. The survey used weighted criteria to provide the required learning outcomes for navigation. A five point Likert-type scale was used to gather data on the importance of specified training elements. In the report on the survey, three areas of training needs were identified as significant; ship handling, collision avoidance, and navigation.

> Certain functions are performed so infrequently and their criticality is so high that competence in their performance can only be gained and assessed by the use of simulation techniques.
>
> The use of simulators for the assessment of all the highly critical skills is emphasized because, short of examiners proceeding to sea, it is only knowledge which is ever assessed and the demonstration of skills is never observed, rather it is assumed by virtue of the production of a watchkeeping certificate.[6]

In was also concluded that ship handling simulator training was to be considered a viable means of conducting assessment and thus a tool for training and research.

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[6]L. A. Holder and D. Moreby, "Technology and Manning for Safe Ship Operations in the 1990's", report prepared for the Department of Transport. UK. 1986.

Canadian Study and Survey Related to Ship Handling Simulators

Arctec Canada Ltd. conducted two studies related to ship handling simulators. The first study[7] was prepared for the Canadian Coast Guard in 1984. The report of the study documented the performance specification for a ship handling simulator that included ice handling capability. The purpose of the study was to establish the technical requirements for a ship handling simulator, however the training needs to be met by the simulator were not identified. The report makes a reference to simulator training for sea going personnel in the context of ship handling. The authors of the report suggested simulator training would be conducted for ships masters, officers and pilots, in port familiarization, navigation in harbours and channels as well as familiarization with new vessel characteristics.

A second more recent study[8] conducted in 1986 investigated the need for a ship handling simulator facility to be established in Canada. The simulator would meet the demands for training by the Canadian shipping industry. The survey questionnaire comprised of thirty six (36) questions, however, only question #3.1 was related to identifying training needs.

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[7]Arctec Canada Ltd., "Canadian Ship handling Simulator Requirement" submitted to the Canadian Coast Guard 1331C. July 1984.

[8]T. Johnstone and R. Abdelnour, "Bridge Simulator Market Survey" submitted to the Regional Industrial Expansion, Newfoundland 1986.

Question 3.1 - If you do feel that a ship handling simulator would be useful for training, please rank the following in order of importance to you, 1 being the highest.
(The numbers next to each concept indicates the final ranking results)

(9)- Training in open water manoeuvring
(6)- Training in manoeuvring in sea ice
(3)- Training for operations of new ships
(5)- Training for manoeuvring in new harbours
(8)- Daytime training
(4)- Nocturnal training
(2)- Training on electronic equipment (navigation)
(7)- Sight specific training
(1)- Closewatch manoeuvring as with offshore structures or in a Seaway

Closewatch manoeuvring (ship handling) and navigation were ranked as #1 and #2 respectively. This was consistent with other findings identified in the reviewed literature.

United States Coast Guard Study on Ship Simulator Training

A series of comprehensive studies of the effectiveness of ship simulator training were undertaken by U.S.C.G. between 1977 and 1983, known as the Training and Licensing Program.[9] The Studies were described as logical analysis, and commenced with an examination of simulator effectiveness in the aircraft and nuclear power industries. These industries where chosen as having similarity and useful to determine training effectiveness.

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[9]Computer Aided Operations Research Facility (C.A.O.R.F.) U.S., "A Comparative Analysis of Ship handling Simulator based training programs" 1985.

This jointly sponsored U.S. Coast Guard and U.S. Maritime Administration program was conducted at Computer Aided Operations Research Facility over a six-year period. It was comprised of a series of studies and experiments, the purpose of which was to define the role of the ship handling simulator in the mariner training and licensing process, using simulator-based training experiments with cadets, masters and pilots.

Findings, derived from the analysis gave evidence to conclude that simulator-based training is preferable to at-sea training for the achievement of many training objectives. Safety, cost, and training control factors were mitigating factors. Identification of specific training objectives derived from an analysis of marine accident reports showed simulator-based training has potential benefit in reducing collisions, rammings, and groundings. These training needs form the core for which simulator training facilities could qualify to receive U.S. Coast Guard licensing credit for their training programs.

An extensive analysis of simulation and its application in the marine industry were contained in a series of reports under the program. The fiscal reports were used for the compilation of existing deck officer task analyses; development of skills, knowledge, input characteristics, and training objectives for cadets, deck officers, and pilots. Analysis of the data identified the potential of cost-effectively achieving certain training objectives via simulator-based training in comparison with at sea training. Additional training was identified for masters in areas of navigation management, ship communications, ship handling, emergency procedures, rule of the road and restricted water navigation.

The U.S. Coast Guard, Office of Merchant Vessel Personnel, recognize simulator-based training as an alternative in fulfilling certain mariner licensing requirements replacing traditional requirements. Individuals who pass approved courses in schools that have simulators receive partial credit toward acquiring a license. The certification procedure conducted by the U.S. Coast Guard is based, in large part, on the guidelines developed by the Training and Licensing Program.

The Growth and Development of Ship Handling Simulators

Muirhead[10] in his thesis submitted to the University of Wales in 1985 reviewed the development of simulation and its applications to marine training and research. A general approach highlights many international facilities from which he identified their training programs and ship handling simulators. The thesis was a study of ship handling performance standards for mariners, comparing the results obtained by traditional methods of examination with those achieved through the medium of the ship handling simulator. Performance measures were identified using several groups of mariners being subjected to a programme of assessment. The findings of this thesis showed that simulator training programmes should be designed to meet specific training objectives. The assessment programme should be designed to test the mariner's competence in any of the skills encompassed in the training.

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[10]P. Muirhead, "The growth and development of Ship handling Simulator Systems: From Training devices to Practical Assessment tool - an Investigation" (Masters Thesis, University of Wales) 1985. p243.

In conclusion, Muirhead discusses the potential use of simulators for both training, and as a means of assessment.

> The range of tasks that can be produced is fairly comprehensive, depending upon the sophistication of the equipment. However, the number of training objectives and individual tasks that can be included in any programme is restricted . It is therefore very important that those responsible for the design and structuring of simulator courses identify those aspects of marine training that will produce the maximum benefit to both mariner and industry.[10]

5. Conclusion

It was evident that a very broad range of training requirements related to ship handling simulators exists. Throughout the related literature review the generalization in training requirements focused on ship handling, navigation and procedural skills. Ship handling simulator training required to meet the needs of the Canadian marine environment may be similar to that of the Australian, American and European marine environment. No systematic research had been conducted on Canadian mariners to substantiate what their views were on the marine training requirements which may be addressed using a ship handling simulator. There continues to exist a need to investigate how simulation can best be utilized in the Canadian marine training system.

CHAPTER 4

DESIGN OF THE STUDY

1. Introduction

To identify the training needs a ship handling simulator may meet for Canadian mariners, a questionnaire was designed to survey the opinions of the marine industry. The questionnaire focused on the five research questions stated in Chapter 2. A separate section in the questionnaire allowed respondents to identify themselves by: (1) industrial diversity; (2) industrial role; (3) familiarity with ship handling simulators; (4) attendance at a radar simulator course; (5) nationality of the marine certification held. The first three questions were the variables for group analysis of the total data collected, the final two questions were included to ascertain the marine background of the respondents. Marine training and certification are governed by international standards and regulations which do not include the mandatory training on ship handling simulators. Mariners are traditionally reluctant to change, therefore the study has attempted to identify areas of training that will establish a solid training base for future training on ship handling simulators.

The concept of opinion is important because they shape perceptions, influence behaviour and govern actions. The input of opinions into the design of a training program will reflect the needs as well as enhance student participation.

J.Guilford[11] gives a definition of an opinion as:

> a personal disposition common to individuals. . . The logic behind the use of opinion is that there is a positive correlation

between what people say on a subject and what they will do about it.

Amongst the pioneers of opinion and attitude scale construction were Murphy and Likert[12] who observed that:

> The verbal declaration of opinions and attitudes are regard as an indirect method of measuring dispositions which are most easily signified and expressed in verbal form.

Although there is the obvious element of subjectivity within a survey of this type, use of such a measure is suitable and appropriate.

2. The Instrument

Type of Instrument

The questionnaire was developed to allow for a rating to be placed against each training item listed. The majority of the questionnaire utilizes the Likert-type format. The participants were asked to circle the one response, out of five, which indicated, in their opinion, how appropriate the training item was with reference to the ship handling simulator. The assumption that opinions do translate into expected behaviour was made, thus a rating of responses would serve as an indicator of such behaviour. The responses provided a range of strongly disagree, disagree, undecided, agree and strongly agree. An arithmetic value ranging from one to five was assigned to each of the responses respectively as follows;

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[11] J.P.Guilford, Psychometric methods. New York McGraw-Hill 1954 p.457.

[12] G.Murphy and R.Likert, Public opinion and the individual. New York Harper and Brothers. 1938 p.28.

Strongly *Disagree*	*Disagree*	*Undecided*	Agree	Strongly Agree
1	2	3	4	5

The Likert type format was utilised because it has been widely used and is similar in format to that used in Canadian Coast Guard examinations to which the respondents are familiar. The questions which were carefully formulated and organised were not difficult to construct or interpret using such a design.

Description of the Instrument

The questionnaire was designed to provide detailed information from respondents allowing for crosstabulation by; industrial diversity, industrial role within the marine industry, and familiarity with ship handling simulators. To identify a broad in-depth basis for training, the questionnaire was divided into nine sections. The first section, section A, gathered the participants background information while the remaining eight sections asked specific questions related to marine activities and training areas.

The first research question was addressed in sections B through E. Section B focuses on ship handling and related skills, sections C, D and E concentrate on navigation techniques, emergency response and bridge team work respectively.

Research questions 2, 3 and 4 were addressed in sections F, G and H respectively. These sections asked for opinions with reference to the offshore petroleum industry, the fishing industry and ice navigation.

Section I addressed the final research question and was less specific in seeking opinions on specialized areas.

Finally, an appendage was attached to facilitate comments by the participants.

3. Method of Selecting Question Items.

In preparing the questionnaire for this study the related literature was reviewed and appropriate items were selected. Informal discussions were conducted with mariners as well as with representatives of various shore based sectors of the marine industry. They included vessel operators and marine college faculty. Training profile abstracts from some of the thirty facilities throughout the world were collected and incorporated into the list of question items.

The selections of questions for the groups B, C, D and E of the instrument was based upon international training guidelines, and through informal discussions with experienced mariners. Ship handling, navigation, emergencies and bridge team work are functions common to all sectors of the marine industry and are developed throughout a mariner's career. The specific questions reflect the daily routine duties of mariners as well as those skills that are also necessary for specialized situations.

In developing the questions for the offshore petroleum industry, discussions were held with serving masters and mates who had operated off Canada's East coast. Final selection of the questions also reflects input from the vessel operators and the Petroleum Directorate.

Section G refers specifically to the fishing industry, the questions resulted from discussions with serving fishing masters and mates as well as fishing vessel operators.

The questions referring to navigation in ice, reflect the unique environmental conditions of Canada's marine industry. An ice symposium was held in St. John's in 1987 giving rise to many questions. Through informal

discussions with participating speakers and reviewing the symposium transcript it was possible to develop the nine listed questions.

The final group of questions in the survey, Section I, represent questions that were intended to stimulate further investigation into the use of simulators in training. The questions in this section were those of the researcher and were based on areas identified in reviewing related literature's.

4. Validity

The full questionnaire was submitted to twenty-one mariners for validation. These included, five sea-going mariners representing fishing, oil exploration and general marine industry, two government employees, one management personnel, four educational faculty, three students and six serving masters from the coastal shipping industry. Of the six serving masters it is worth noting that three had recently attended a training course at a ship handling simulator facility in the U.S.A. In addition to amendments based on appropriate comments, the instrument was adjusted to remove ambiguities and improve clarity of the questions .

5. Population and Sample

The population of individuals involved directly and indirectly with the marine industry amounted to many thousands and was in constant flux. Although there were some statistics available to describe these parameters, specific data on location of the population was not available and this made a random sample difficult to obtain. The study therefore chose accessible mariners that were able to respond to Questions #1 and #2 of the survey. The

actual number of mariners surveyed was not controlled as the distribution of the questionnaire was conducted in two ways. The questionnaire was initially distributed to one hundred and twenty seven individual mariners and to forty two centres being Coast Guard offices, marine colleges and shipping companies. The various centres were requested to distribute the questionnaire to marine employees, students as well as certified mariners.

The survey was distributed throughout the Canadian marine industry to identify the wide scope of training needs that may be accomplished on the ship handling simulator. The questionnaire was distributed to mariners representing the Great Lake Shipping operations, the fishing industry, offshore oil exploration industry, coastal and general shipping industries, as well as other related groups such as federal agencies and educational institutions.

6. Collection of Data

The distribution of a cover letter and the questionnaire was by mail and fax. All questionnaires were returned by mail with the exception of seven faxed returns and those distributed at the Pacific Marine Training Institute in Vancouver which were collected by the researcher. There was no restriction on how many questionnaires were distributed at any particular location, however it was requested that distribution be restricted to certificated mariners.

The Great Lake ship operators were training their personnel at a ship handling simulator facility, as a consequence, Upper Lake Shipping was asked to distribute the questionnaire to their employees.

Coastal shipping reflects the marine sector of the industry operating on Canada's east and west coasts. Typically these mariners were employed by B.C. Ferries and Marine Atlantic as well as smaller seasonal operators. Mariners from the general shipping sector refers to Canadians who associate themselves with foreign going (international trading) deep-sea shipping and those not included in the previous groups. Questionnaires were mailed to mariners from shipping company address lists, and to all members of the Nautical Institute in Canada (International organization requiring a master mariners certificate for membership).

Due to the unpredictable nature of the offshore petroleum and fishing industries, distribution of the questionnaire to these sectors of the industry was less controllable. To access these groups questionnaires were distributed to Fishing schools in eastern Canada, and to students attending fishing courses. Mariners from the oil exploration were asked to identify them-selves as such through the general process of distribution.

Questionnaires were distributed to all Canadian Coast Guard Regional and District offices as well as all marine schools and colleges in Canada. In addition questionnaires were distributed through the B.C. Pilotage authority office to their members.

A telephone conversation was initiated by the researcher with each distribution centre prior to the questionnaire being delivered to an established contact person. The purpose of the telephone communication was to establish the cooperation of the centre to distribute the questionnaire, and to identify a contact person.

7. Analysis of Data

The analysis of data uses descriptive statistics transcribed from the five point responses for each question using Microsoft Excel computer software. The data was used to calculate the standard deviation, mean and median averages for each question. All questions were tabulated using raw scores from total returns. The data presents the responses to **how appropriate is this training,** and does not compare the responses between specific groups. Unanswered questions on returned responses have been allocated a value of 3 (undecided). Total responses to questions where the mean and median averages are dissimilar and the standard deviation exceeds 1.0, were crosstabulated against the variables in section A. These variables are; role within the industry, familiarity with ship handling simulators, and sector of the industry being represented. For each of these questions a correlation table is presented using the grand totals from each sector of the industry. Due in part to the fact that oil exploration and the fishing industry are unique, all questions in sections F and G were crosstabulated against the total responses.

The data presented, reports the total scores against each question and reflects, in the opinion of those surveyed, the training needs for specific sectors of the marine industry in Canada. The instrument allowed for respondents to submit comments. All comments received from respondents are grouped and reported upon following the analysis of the data.

CHAPTER 5

ANALYSIS OF DATA

This chapter comments on the responses to the study and discusses some of the relevant findings. Each section of the study is reviewed separately providing data to substantiate the observations. With the exception of section A, all responses have been totalled and the mean average, median average and standard deviation reported for all questions in each section. The data was analysed with a confidence level of 95%. Where the standard deviation of the response to any question was equal to or greater than one (≥ 1) a further analysis was undertaken. The additional analysis has been presented in cross tabulation tables using the first three questions in section A of the questionnaire as the variables. Further, a correlation of the total responses for each sector of the industry (as in question one, section A, of the questionnaire) is reported in the tables for these questions. The correlation values were calculated to establish variance, if any, between the responses made by each sector of the industry. All comments from the respondents have been included at the end of the chapter.

1. Responses to questionnaire

The questionnaire was delivered to relevant locations in the shipping industry for distribution. Locations included Coast Guard offices, nautical colleges and shipping companies. In addition the questionnaire was distributed to individuals who's names appeared on membership lists supplied

by organizations such as the Nautical Institute. The survey was conducted during the spring and summer of 1993. At the time data analysis commenced, 201 questionnaires had been returned. The total population of those involved in the marine industry is an unknown, however it was anticipated that 166 returns would be received in the ratio of 25 each from the Great Lakes, Fishing, Coastal, and Oil exploration sectors of the industry and 66 from the General merchant fleet sector. Although the overall survey returns exceeded expectations, the ratio of survey returns from each industry sector varied disproportionately. A disparity between the number of predicted survey returns and actual survey returns was anticipated as the distribution of the questionnaire was not controlled. The responses to section A of the questionnaire are shown in table 5.1.

TABLE 5.1
SUMMARY OF RESPONSES TO SECTION A --GENERAL QUESTIONS

1. Which one of the following do you most represent?

37	Great Lake shipping
17	Fishing industry
17	Oil exploration and support vessels
28	Coastal vessel operator
102	General merchant fleet (including government vessels)

2. In which role are you currently engaged?

81	Sea Going
12	Management
56	Education
7	Student
42	Government
3	Other (please state) _____

Table 5.1 continued

3. How familiar are you with ship handling simulators?

78	Attended a course
33	Visited a facility
43	Read related literature
8	Based on other's opinions
39	None
0	Others (please state) _____

4. Have you attended a radar simulator course within the last ten (10) years?

169	Yes
32	No

5. Were your Marine qualifications obtained in Canada?

148	Yes
53	No

During the period of data analysis a further eighteen completed questionnaires were received, however it was not practical to include this data in the analysis process as they were received at irregular intervals. The data was reviewed and all comments from these late survey returns has been included at the conclusion of this chapter.

2. Section A-General questions.

The first section of the survey, section A, collected data with respect to the individual respondents. The data from the first three questions within this section then formed the categories for cross tabulation. The questions were grouped under five main headings as shown in table 5.1.

The first question sought to identify the respondents by sector of the industry. This was of primary importance to the study as training needs may

vary between industry sectors.

The second question categorized the respondents into their employment role within the marine industry. Although all respondents held similar minimum training levels, their position within the industry may reflect a different opinion concerning training needs. Of the 201 returns, 81 (40%) were from seagoing personnel, 56 (28%) from educators, 42 (21%) from government employees, 12 (6%) from industry management and the remaining 10 (5%) from students and others who identified themselves as marine surveyors.

The third question of section A sought to identify how familiar respondents were with ship handling simulators. There are presently over thirty ship handling facilities in the world, offering training programs. Many of their courses are custom designed to meet the needs of specific groups such as the B.C. Pilots. Of the 201 returns 111 (55%) had visited a facility and of these, 78 (70%) had attended a course on a ship handling simulator. Of the remaining 90 respondents 43 (21%) were familiar with simulators by means of reading related literature and 47 (20%) had little or no familiarity with ship handling simulators.

Question four of section A asked respondents to identify recent attendance on a conventional radar simulator course. Radar simulators are the predecessors of ship handling simulators, consequently attendance on such a course would assist in passing opinions on future questions. The data collected through this question showed that 169 (84%) of the 201 respondents had attended a course within the last ten years.

The final question in section A sought to identify the nationality of the

respondents marine qualifications. Many of the mariners in Canada originated from other nations whose training methods and needs may not necessarily be those suitable for Canadian mariners. In the final collection of data, 148 (74%) of the 201 respondents had obtained their qualifications in Canada.

3. Section B-Ship handling.

The sixteen questions in this section dealt solely with the handling of a vessel in what are becoming increasingly routine situations. Ships are becoming larger and mariners are required to be competent in using the advanced technology available. Various scenarios at sea, in estuaries, in collision avoidance situations, as well as specialised ship manoeuvring were presented to those surveyed. The responses to section B are reported in table 5.2.

With the exception of questions #7 and #10 there was an agreement of opinion that the various scenarios presented were areas of training for which a ship handling simulator would be appropriate. The relatively high standard deviation values in questions #7 and #10 indicate doubt as to whether or not training for certain types of manoeuvring such as dry docking a vessel and handling a vessel in adverse weather conditions are appropriate on a ship handling simulator. The data for questions #7 and #10 showed a relatively high number of responses in the undecided category as well as in the disagree column. Both areas of ship handling are very specialised skills and require practice and experience.

TABLE 5.2
SUMMARY OF RESPONSES TO SECTION B. SHIP HANDLING

	SD	D	U	A	SA	mean	med.	st.dev.
1.Handling a vessel in a river or estuary having regard to the effects of current, wind and restricted water on the response to the helm	1	6	9	96	89	4.32	4	0.74
2.Manoeuvring in shallow water and confined areas	1	6	19	93	82	4.24	4	0.78
3.The interaction between passing vessels and between own ship and nearby banks	1	5	30	89	76	4.16	4	0.80
4.Berthing and unberthing in various conditions of weather	3	7	18	89	84	4.21	4	0.85
5.Berthing and unberthing with and without the assistance of tugs	3	9	24	92	73	4.10	4	0.89
6.Anchoring in various conditions using different moors	0	11	36	115	39	3.90	4	0.76
7.Handling and managing a vessel at sea in adverse weather conditions	7	29	47	85	33	3.53	4	1.04
8.Approaching pilotage stations with due regard to traffic and weather conditions	1	13	23	103	61	4.04	4	0.85

Table 5.2 continued

	SD	D	U	A	SA	mean	med.	st.dev.
9.Manoeuvring in traffic separations scheme	2	15	22	97	65	4.03	4	0.91
10.Dry docking a vessel	13	33	62	68	25	3.29	3	1.08
11.Ship handling and manoeuvring of:								
(a) various vessel types	0	0	6	96	99	4.46	4	0.56
(b) various loaded conditions	0	1	14	106	80	4.32	4	0.62
(c) various engine, bowthruster configuration	1	1	14	102	83	4.31	4	0.67
(d) unfamiliar circumstances	1	7	27	82	84	4.19	4	0.84
(e) familiar circumstances	1	7	27	114	52	4.03	4	0.76
12.Collision avoidance manoeuvring	2	4	19	70	106	4.36	4	0.81
13.Vessel manoeuvring characteristics (advance and transfer)	3	2	17	100	79	4.24	4	0.77
14.Using navigational bridge equipment	3	11	24	94	69	4.07	4	0.90
15.Multi-ship collision avoidance	2	7	14	77	101	4.33	4	0.83

Table 5.2 continued

	SD	D	U	A	SA	mean	med	st.dev.
16.Manoeuvring								
(a) by day	0	7	19	110	65	4.15	4	0.73
(b) by night	0	5	17	110	69	4.20	4	0.70
(c) in restricted visibility	1	10	19	84	87	4.22	4	0.85

The data for both questions was cross tabulated and is shown in table 5.3 for question #7 and table 5.4 for question # 10. In question #7 the fishing group showed a low correlation value with other groups, however the number of respondents was low (17) and does not account for the overall high number of undecided and disagrees responses. Of the 111 who had visited a simulator or who had attended a ship handling course, 68 (61%) agreed while 33 (39%) remained undecided or disagreed.

Of the 201 responses to question #10, 62 (31%) remained undecided and 46 (23 %) disagreed. The correlation between groups was consistent with the exception of the fishing sector which was low. Although 93 (46 %) of the total respondents agreed or strongly agreed, only 40 (36 %) of those who had been to a facility indicated that dry-docking was a training need to be met by a ship handling simulator. The data from the overall returns indicate that the training for dry-docking may be better achieved using other methods such as on the job training.

4. Section C-Navigation

The concept of navigation is fundamental to all deck officers irrespective of the sector within which they are employed. Traditionally the

Table 5.3.
Question B.7
Handling and managing a vessel at sea in adverse weather conditions.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none				
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	1	1	0	2	0	0	0	0	1	1	0	0	0	0	0	3
undecided	3	0	2	5	1	0	1	2	0	2	1	1	0	0	0	9
agree	8	0	1	9	1	1	2	4	0	4	1	1	3	1	4	20
strongly agree	3	0	0	3	1	0	1	0	0	0	0	0	1	0	1	5
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	1	1	3
undecided	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
agree	2	0	1	1	4	0	0	0	1	1	0	0	1	2	3	8
strongly agree	0	1	0	0	1	0	0	1	0	1	1	1	0	0	0	3
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
undecided	0	0	0	1	1	2	1	0	3	0	0	1	1	5
agree	1	3	4	2	2	2	0	0	2	0	0	0	0	8
strongly agree	0	1	1	1	1	0	0	0	0	1	1	0	0	3
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.80	1.00			
Oil	0.97	0.67	1.00		
Coastal	0.92	0.54	0.95	1.00	
General	0.96	0.76	0.94	0.94	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total		
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
disagree	1	0	1	2	1	0	0	1	0	0	0	0	0	0	1	0	0	1	4		
undecided	1	0	0	1	0	0	0	0	1	1	1	3	0	0	4	0	1	5	9		
agree	2	1	1	4	0	1	0	1	2	0	0	2	1	1	0	1	2	3	11		
strongly agree	2	0	0	2	0	0	1	1	0	0	0	0	0	0	0	1	0	1	4		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	1	0	0	1	2	5
disagree	3	1	3	0	2	9	0	0	3	1	0	4	1	0	1	2	0	4	0	0	0	0	0	0	1	1	18
undecided	4	1	2	1	1	9	0	0	2	1	0	3	1	0	1	2	1	5	0	0	0	0	3	1	2	6	23
agree	4	0	3	0	6	13	1	1	4	3	0	9	1	1	2	5	0	9	2	2	0	0	3	0	2	5	38
strongly agree	3	0	2	0	0	5	0	1	3	0	1	5	0	1	1	1	0	3	0	0	1	2	1	0	1	5	18
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none				
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1
undecided	6	1	1	8	1	0	1	3	0	3	2	2	2	0	2	16
agree	6	0	2	8	0	1	1	1	1	2	0	0	0	1	1	12
strongly agree	2	0	0	2	2	0	2	2	0	2	0	0	2	0	2	8
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	1	0	0	1	1	1	0	1	1	0	0	0	0	0	3
agree	1	0	1	1	3	0	0	1	0	1	1	1	1	3	4	9
strongly agree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
response	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	1	0	0	1	0	0	0	0	1
disagree	1	1	2	1	1	0	0	0	0	0	0	0	0	3
undecided	0	2	2	1	1	0	1	1	2	0	0	1	1	6
agree	0	1	1	1	1	3	0	0	3	0	0	0	0	3
strongly agree	0	0	0	1	1	0	0	0	0	1	1	0	0	2
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.43	1.00			
Oil	0.86	0.48	1.00		
Coastal	0.84	0.76	0.91	1.00	
General	0.63	0.56	0.92	0.88	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2		
disagree	0	0	1	1	0	1	0	1	0	0	0	0	0	0	1	0	1	2	4		
undecided	2	0	0	2	0	0	0	0	0	1	0	1	0	0	3	1	1	5	8		
agree	2	1	1	4	0	0	0	0	3	0	0	3	1	1	1	0	1	2	10		
strongly agree	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	1	0	1	4		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																										
FAMILIAR	attended						visited						read					opinion		none							
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	2	0	1	4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	1	2	7
disagree	4	0	4	1	2	11	0	0	4	1	0	5	0	0	2	2	1	5	0	0	0	1	0	0	2	3	24
undecided	3	1	2	0	4	10	1	1	5	2	0	9	0	0	1	2	0	3	1	1	1	0	2	0	3	6	29
agree	6	0	2	0	2	10	0	0	2	1	1	4	4	1	1	5	0	11	1	1	0	1	4	1	0	6	32
strongly agree	1	0	1	0	0	2	0	1	1	1	0	3	0	1	1	1	0	3	0	0	0	0	1	0	1	2	10
Total	1	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5. 4.
Question B.10
Dry docking a vessel.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

practical training needs in navigation have been met by the use of radar navigation simulators and seagoing experience. Having an established median for training may account for the relatively high number of undecided and disagree responses, which is shown in table 5.5. Of the eleven question in this section, questions #3, #4, #7, #9, #10a, and #10c had standard deviation values ≥ 1 are further analyzed as per tables 5.6, 5.7, 5.8, 5.9, 5.10 and 5.11 respectively.

The responses to question #3, navigation in open sea, are cross tabulated and are shown in table 5.6. The oil exploration group correlation values were relatively low with all other groups however the number in this group was too small to explain the high undecided and disagree returns. The overall returns showed 89 (44%) agreed with the training and of these, 57 had attended a simulator facility.

TABLE 5.5
SUMMARY OF RESPONSES TO SECTION C. NAVIGATION.

	SD	D	U	A	SA	mean	med.	st.dev.
1.Navigation on coastal passages	4	20	24	102	51	3.87	4	0.97
2.Navigation in confined waters	1	7	7	104	82	4.28	4	0.74
3.Navigation in open sea	18	47	47	60	29	3.17	3	1.20
4.Passage preparation and execution	9	29	41	80	42	3.58	4	1.11
5.Pilotage support procedures	2	15	39	104	41	3.83	4	0.87

Table 5.5 continued

	SD	D	U	A	SA	mean	med.	st.dev.
6.Watchkeeping practices and procedures	4	22	24	97	54	3.87	4	0.99
7.Radio communication (V.H.F., S.S.B.)	7	30	35	86	43	3.63	4	1.08
8.Collision avoidance	2	7	13	83	96	4.13	4	0.82
9.Recognition of navigational lights and shapes	9	18	25	86	63	3.87	4	1.09
10.Navigation position fixing using:								
(a) visual bearings	6	24	54	83	34	3.57	4	1.00
(b) radar range and bearings	4	20	22	93	62	3.94	4	0.99
(c) electronic systems	6	18	22	98	57	3.91	4	1.00
11.Automatic Radar Plotting Aids (A.R.P.A.) systems	3	10	25	93	70	4.08	4	0.89

The question related to navigation passage planning was asked in #4 of section C. The data was cross tabulated and shown in table 5.7. Of the total 201 responses, 79 (39%) either disagreed or were undecided. The correlation values between groups was least when comparing the Great Lake sector and the General merchant sector with other groups. However the correlation between these two groups was high. In both groups there was a relatively larger number of disagreed and undecided responses. The responses from the Great Lake sector showed 50% of those having attended a course at a ship handling facility were undecided or disagreed, a similar figure is reflected from the General merchant sector.

Table 5.6.
Question C.3
Navigation in open sea.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total		total	seagoing	manage'	total	Grand total
strongly disagree	2	0	0	2	0	0	0	0	0	0	1	1	0	0	0	3
disagree	3	1	1	5	0	0	0	3	0	3	0	0	2	0	2	10
undecided	2	0	1	3	1	0	1	3	1	4	0	0	1	1	2	10
agree	7	0	1	8	1	1	2	0	0	0	1	1	0	0	0	11
strongly agree	1	0	0	1	1	0	1	0	0	0	0	0	1	0	1	3
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	3	0	0	0	3	0	0	0	0	0	0	0	0	2	2	5
undecided	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	2
agree	0	0	1	1	2	0	0	1	1	2	1	1	1	0	1	6
strongly agree	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
undecided	1	2	3	0	0	0	0	0	0	0	0	0	0	3
agree	0	2	2	2	2	2	0	0	2	1	1	1	1	8
strongly agree	0	0	0	2	2	2	1	0	3	0	0	0	0	5
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.70	1.00			
Oil	0.33	0.45	1.00		
Coastal	0.95	0.60	0.54	1.00	
General	0.94	0.72	0.44	0.88	1.00

REPRESENT	COASTAL SHIPPING																		
FAMILIAR	attended				visited				read				opinion		none				
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
disagree	0	0	0	0	0	1	0	1	2	0	0	2	0	0	1	1	1	3	6
undecided	1	0	0	1	0	0	0	0	1	1	1	3	1	1	3	1	0	4	9
agree	5	1	2	8	0	0	0	0	0	0	0	0	0	0	0	0	2	2	10
strongly agree	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	1	1	1	0	1	4	0	0	2	1	0	3	2	0	0	0	0	2	0	0	0	0	1	0	2	3	12
disagree	4	0	3	0	2	9	0	1	3	1	0	5	0	0	2	5	1	8	1	1	0	1	0	0	1	2	25
undecided	3	1	3	0	2	9	0	0	2	1	0	3	1	0	1	2	0	4	1	1	1	1	2	1	1	6	23
agree	4	0	1	1	2	8	0	0	2	1	0	3	1	2	1	3	1	8	0	0	0	1	3	0	2	6	25
strongly agree	2	0	3	0	2	7	1	1	3	1	1	7	0	0	1	0	0	1	0	0	0	0	1	0	1	2	17
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none				
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total	
strongly disagree	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	2	
disagree	3	0	1	4	1	0	1	2	0	2	0	0	0	0	0	7	
undecided	3	0	1	4	0	0	0	3	1	4	0	0	1	1	2	10	
agree	5	1	1	7	0	1	1	1	0	1	1	1	1	0	1	11	
strongly agree	3	0	0	3	2	0	2	0	0	0	0	0	2	0	2	7	
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37	

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total	
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2	
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
agree	3	0	1	1	5	1	1	1	1	2	1	1	1	2	3	12	
strongly agree	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2	
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17	

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	1	1	0	0	0	1
undecided	0	0	0	1	1	0	0	0	0	0	0	0	1
agree	1	4	5	1	1	3	0	0	3	0	0	1	1
strongly agree	0	0	0	2	2	1	1	0	2	1	1	0	0
Total	1	4	5	4	4	4	1	1	6	1	1	1	1

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.52	1.00			
Oil	0.62	0.91	1.00		
Coastal	0.85	0.85	0.86	1.00	
General	0.93	0.66	0.83	0.89	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	
undecided	0	0	0	0	0	1	1	2	2	0	1	3	0	0	0	2	0	2	7	
agree	3	1	2	6	0	0	0	0	1	1	0	2	1	1	3	0	3	6	15	
strongly agree	2	0	0	2	1	0	0	1	0	0	0	0	0	0	1	0	0	1	4	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																											
FAMILIAR	attended						visited						read					opinion		none								
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total	
strongly disagree	0	1	0	0	1	2	0	0	0	1	0	1	1	0	0	0	0	1	0	0	0	1	1	0	0	2	6	
disagree	4	0	0	0	3	7	0	0	2	1	0	3	0	0	1	3	0	4	1	1	0	0	0	0	2	2	17	
undecided	1	1	2	0	2	6	0	0	2	1	0	3	1	1	2	2	1	7	1	1	1	1	4	0	0	6	23	
agree	5	0	5	1	2	13	0	2	3	1	0	6	2	1	0	4	1	8	0	0	0	0	1	1	3	5	32	
strongly agree	4	0	4	0	1	9	1	0	5	1	1	8	0	0	2	1	0	3	0	0	0	1	1	0	2	4	24	
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102	

Table 5.7.
Question C.4
Passage preparation and execution.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

Question #7 of section C asked for an opinion on appropriateness of training for radio communications using a ship handling simulator. From the overall responses 129 (64%) agreed with the appropriateness, a result which was consistent in all groups. The undecided responses to this question may have been influenced by the isolation of radio communication from the role it normally plays within the larger area of navigation bridge operations.

One of the technological advances from radar simulator to ship handling simulators is the ability to display daylight and night-time visual scenes. As well as supplying a sense of realty to the training, visual capability also allows the trainees to utilise his or her visual senses which is not the case with radar simulators which are often referred to as blind pilotage simulators. Question #9 of section C asked for opinions with reference to training in the recognition of navigation lights and shapes. Of the 201 responses, 149 (75%) agreed a consistent response from all sectors. An interesting result from the cross tabulation showed 18 of the 27 disagreed responses came from the general merchant group as did 14 of the total 25 undecided responses. Of these 14 undecided responses 9 were from those who had attended or visited a ship handling facility. A similar ratio was found for the disagree responses.

The training in the use of visual bearings as a navigational technique is generally restricted to onboard ship. Responses to question #10.a showed 117 (58%) of the 201 returns agreed with this training on ship handling simulators, with 54 (27%) being undecided. The cross tabulation displayed in table 5.10 showed a good correlation between all groups. The Great Lakes sector recorded 14 (38%) undecided of which 10 had attended or visited a ship handling simulator facility.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
disagree	3	0	1	4	1	0	1	3	0	3	1	1	0	0	0	9
undecided	2	0	0	2	0	1	1	2	0	2	0	0	1	1	2	7
agree	6	1	2	9	1	0	1	1	0	1	1	1	1	0	1	13
strongly agree	3	0	0	3	1	0	1	0	1	1	0	0	2	0	2	7
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
undecided	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	2
agree	5	0	0	1	6	1	1	0	0	0	0	0	1	2	3	10
strongly agree	0	1	1	0	2	0	0	0	1	1	0	0	0	0	0	3
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

Table 5.8.
Question C.7
Radio communication
(V.H.F. & Single side band.)

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	1	0	1	0	0	0	0	1	1	0	0	0	0	2
agree	0	4	4	1	1	2	0	0	2	1	1	1	1	9
strongly agree	0	0	0	3	3	2	1	0	3	0	0	0	0	6
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.75	1.00			
Oil	0.68	0.90	1.00		
Coastal	0.83	0.93	0.97	1.00	
General	0.93	0.91	0.84	0.92	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
disagree	0	0	0	0	0	0	1	1	1	0	1	2	0	0	0	0	0	0	3	
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3	3	
agree	3	1	2	6	0	1	0	1	1	0	0	1	1	1	2	0	3	5	14	
strongly agree	3	0	0	3	1	0	0	1	1	1	0	2	0	0	2	0	0	2	8	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	1	0	1	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	1	5
disagree	2	0	3	0	0	5	0	0	3	2	0	5	0	0	1	1	1	3	1	1	0	0	1	0	2	3	17
undecided	3	1	3	0	1	8	0	1	1	1	0	3	0	1	2	2	0	5	1	1	0	0	2	0	2	4	21
agree	7	0	0	1	5	13	0	1	4	1	0	6	3	1	1	7	1	13	0	0	1	2	2	1	2	8	40
strongly agree	2	0	4	0	2	8	1	0	4	1	1	7	0	0	1	0	0	1	0	0	0	1	1	0	1	3	19
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.9.
Question C.9
Recognition of navigation lights and shapes.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
disagree	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	2
undecided	4	0	0	4	0	0	0	1	0	1	0	0	0	1	1	6
agree	6	0	3	9	1	1	2	2	0	2	2	2	2	0	2	17
strongly agree	4	1	0	5	1	0	1	2	1	3	0	0	2	0	2	11
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
agree	0	1	0	1	2	1	1	1	0	1	1	1	0	3	3	8
strongly agree	3	0	1	0	4	0	0	0	1	1	0	0	1	0	1	6
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	0	0	0	0	1	1	0	0	0	0	2
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	0
agree	0	3	3	2	2	1	0	0	1	1	1	1	1	8
strongly agree	1	0	1	2	2	3	1	0	4	0	0	0	0	7
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.94	1.00			
Oil	0.89	0.99	1.00		
Coastal	0.98	0.99	0.96	1.00	
General	0.99	0.98	0.94	0.99	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
disagree	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	2	
undecided	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1	3	
agree	2	1	2	5	0	0	0	0	1	0	0	1	1	1	3	1	2	6	13	
strongly agree	3	0	0	3	1	0	0	1	1	1	1	3	0	0	2	1	0	3	10	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	2	0	0	3	0	0	2	0	0	2	1	0	0	1	0	2	0	0	0	0	1	0	0	1	8
disagree	2	1	0	0	1	4	0	0	1	0	0	1	0	0	1	1	1	3	0	0	0	0	1	0	1	2	10
undecided	3	0	3	0	1	7	0	0	1	1	0	2	0	0	0	1	0	1	0	0	0	6	3	0	1	4	14
agree	4	0	4	1	4	13	0	1	4	3	0	8	3	1	3	3	1	11	1	1	0	1	1	1	4	7	40
strongly agree	5	0	2	0	3	10	1	1	3	1	1	7	0	1	1	4	0	6	1	1	1	2	1	0	1	5	29
Total	14	2	11	1	9	37	1	2	11	5	1	20	4	2	5	10	2	23	2	2	1	3	7	1	7	19	101

Table 5.10.
Question C.10a
Navigation position fixing using:
a)visual bearings.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	2
disagree	0	0	1	1	0	0	0	2	0	2	0	0	0	0	0	3
undecided	7	0	1	8	1	1	2	2	0	2	0	0	1	1	2	14
agree	6	1	1	8	0	0	0	2	0	2	2	2	1	0	1	13
strongly agree	1	0	0	1	2	0	2	0	0	0	0	0	2	0	2	5
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
undecided	3	0	0	0	3	0	0	0	0	0	1	1	0	1	1	5
agree	2	1	0	1	4	1	1	0	0	0	1	1	0	1	1	7
strongly agree	0	0	1	0	1	0	0	0	1	1	0	0	1	1	2	4
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	0	0	0	0	1	1	0	0	0	0	2
undecided	0	1	1	1	1	1	0	0	1	0	0	1	1	4
agree	0	2	2	1	1	3	0	0	3	1	1	0	0	7
strongly agree	1	0	1	2	2	0	1	0	1	0	0	0	0	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.89	1.00			
Oil	0.80	0.97	1.00		
Coastal	0.84	0.93	0.95	1.00	
General	0.83	0.93	0.96	0.99	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
disagree	0	0	0	0	0	0	1	1	1	0	1	2	0	0	0	0	0	0	3	
undecided	1	0	0	1	0	1	0	1	0	1	0	1	0	0	2	1	1	4	7	
agree	4	1	2	7	0	0	0	0	2	0	0	2	1	1	1	1	2	4	14	
strongly agree	1	0	0	1	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																									
FAMILIAR	attended				visited							read						opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	1	1	4
disagree	1	2	3	0	1	7	0	0	3	0	0	3	0	0	0	2	1	3	0	0	0	0	0	0	2	2	15
undecided	5	0	2	0	2	9	0	1	4	1	0	6	1	0	0	2	0	3	0	0	0	0	4	1	1	6	24
agree	4	0	2	1	5	12	0	1	4	3	1	9	1	2	4	3	1	11	2	2	0	2	3	0	3	8	42
strongly agree	3	0	4	0	1	8	1	0	1	1	0	3	0	0	1	3	0	4	0	0	1	1	0	0	0	2	17
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	2	0	0	2	0	0	0	1	0	1	0	0	0	0	0	**3**
undecided	1	0	0	1	0	0	0	2	0	2	0	0	1	1	2	**5**
agree	7	0	3	10	1	1	2	3	0	3	2	2	1	0	1	**18**
strongly agree	5	1	0	6	2	0	2	0	1	1	0	0	2	0	2	**11**
Total	15	1	3	**19**	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	**2**
agree	3	0	0	1	4	0	0	1	0	1	1	1	1	2	3	**9**
strongly agree	2	1	1	0	4	0	0	0	1	1	1	1	0	0	0	**6**
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	1	1	0	0	0	0	1	1	0	0	0	1	**2**
undecided	0	0	0	0	0	1	0	0	1	0	0	0	0	**1**
agree	0	3	3	2	2	1	0	0	1	1	1	0	0	7
strongly agree	1	0	1	2	2	2	1	0	3	0	0	1	1	7
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.99	1.00			
Oil	0.92	0.92	1.00		
Coastal	0.93	0.96	0.89	1.00	
General	0.99	0.97	0.87	0.99	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	
disagree	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	**2**	
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	**1**	
agree	3	1	2	6	0	0	0	0	3	0	0	3	1	1	2	2	3	7	**17**	
strongly agree	3	0	0	3	1	1	0	2	0	1	0	1	0	0	2	0	0	2	**8**	
Total	6	1	2	**9**	1	1	1	**3**	3	1	1	**5**	1	1	5	2	3	**10**	**28**	

REPRESENT	GENERAL MERCHANT FLEET																										
FAMILIAR	attended						visited						read					opinion		none							
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	1	2	0	0	1	0	0	1	2	0	0	0	0	2	0	0	0	0	0	0	1	1	**6**
disagree	2	1	1	0	0	4	0	0	1	0	0	1	0	0	2	2	1	5	0	0	0	0	0	0	1	1	**11**
undecided	1	1	2	0	0	4	0	0	3	0	0	3	0	0	0	2	0	2	1	1	0	0	3	0	0	3	**13**
agree	7	0	2	1	6	16	0	2	3	4	0	9	2	1	3	4	1	11	1	1	0	1	4	1	4	10	**47**
strongly agree	4	0	5	0	2	11	1	0	4	1	1	7	0	1	0	2	0	3	0	0	1	2	0	0	1	4	**25**
Total	14	2	11	1	9	**37**	1	2	12	5	1	**21**	4	2	5	10	2	**23**	2	**2**	1	3	7	1	7	**19**	**102**

Table 5.11.
Question C.10c
Navigation position fixing using:
c) electronic systems.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

The final question to be discussed from section C is #10.e, navigation position fixing using electronic systems. Training for this form of navigation is undertaken in electronic instrument laboratories, radar simulators, or aboard a vessel. Of the 201 respondents, 155 (77%) felt such training would be appropriate using a ship handling simulator. The cross tabulations in table 5.11 showed a high correlation between sector responses. The total number of undecided or disagreed responses was 46 of which 21 had attended or visited a ship handling simulator.

5. Section D-Emergency.

Emergencies at sea are events which mariner's experience but due to the nature of emergencies at sea and the physical restriction involved, the training for such occurrences is limited. With the exception of Marine Emergency Training (M.E.D.) courses which focus on the use of lifeboats, ship evacuation and fire fighting, emergency training is limited to theoretical studies. Responses to each question within this section indicated agreement to the appropriateness of training on a ship handling simulator. The responses to questions from section D are shown in table 5.12. With the exception of question #4.b (engine/bridge equipment failure procedures when in restricted waters), there was a consistently high number (between 18% and 25% of the total 201 returns) of undecided responses to all questions. A high return in this category indicates indecision in either the appropriateness of the training using a ship handling simulator or in the capability of such a simulator to facilitate the training.

Question #4.(a) was a variation on question #4.(b) in as much as the

ship engine failure occurred in open water as opposed to restricted water for navigation. Of the total 201 returns, #4.(a) returned 127 (63%) agreed response as compared to 178 (88.5%) for question #4.(b). The area of water for navigation was the only variable in these questions, therefore the responses indicated that training on a ship handling simulator was more appropriate when the vessel was in restricted waters The cross tabulations for questions #4.(a), #6 and #7 are shown in tables 5.13, 5.14, and 5.15.

TABLE 5.12
SUMMARY OF RESPONSES TO SECTION D. EMERGENCY

	SD	D	U	A	SA	mean	med.	st.dev.
1.Man overboard procedure under various conditions	2	13	39	98	49	3.89	4	0.88
2.Search and Rescue patterns:								
(a) single ship	4	23	34	104	36	3.72	4	0.96
(b) multi ship	4	21	38	103	35	3.72	4	0.94
(c) ship/aircraft	4	22	48	94	33	3.65	4	0.95
3.Co-ordination of a Search and Rescue	6	18	45	91	41	3.71	4	0.99
4.Engine/bridge equipment failure procedures when in:								
(a) open sea	8	30	36	84	43	3.62	4	1.09
(b) restricted waters	2	6	15	97	81	4.24	4	0.79
5.Vessel towing procedures	5	20	48	92	36	3.67	4	0.97

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
disagree	3	1	0	4	0	0	0	0	0	0	0	0	1	0	1	5
undecided	3	0	0	3	0	0	0	5	0	5	1	1	1	1	2	11
agree	6	0	3	9	2	0	2	0	0	0	1	1	0	0	0	12
strongly agree	2	0	0	2	1	1	2	1	1	2	0	0	2	0	2	8
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended				visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
strongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	3	0	0	0	3	1	1	0	0	0	0	0	0	1	1	5
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
agree	1	0	1	1	3	0	0	1	0	1	1	1	1	1	2	7
strongly agree	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	2
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
response	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
disagree	0	1	1	0	0	1	0	0	1	0	0	0	0	2
undecided	0	1	1	0	0	0	0	0	0	0	0	1	1	2
agree	1	2	3	2	2	2	0	0	2	1	1	0	0	8
strongly agree	0	0	0	2	2	1	1	0	2	0	0	0	0	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.27	1.00			
Oil	0.70	0.72	1.00		
Coastal	0.67	0.86	0.97	1.00	
General	0.86	0.62	0.97	0.93	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	
disagree	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	1	1	4	5	
undecided	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	3	
agree	5	1	2	8	0	1	0	1	2	0	0	2	0	0	1	0	2	3	14	
strongly agree	1	0	0	1	1	0	0	1	0	1	0	1	0	0	1	1	0	2	5	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	3
disagree	3	1	2	0	1	7	0	0	1	1	0	2	1	0	0	1	0	2	0	0	0	0	0	0	2	2	13
undecided	1	0	3	0	2	6	0	0	3	1	0	4	0	0	1	4	1	6	1	1	0	0	2	0	0	2	19
agree	6	0	3	1	3	13	0	1	4	2	1	8	1	1	3	5	1	11	1	1	1	1	4	1	3	10	43
strongly agree	4	1	3	0	3	11	1	1	3	1	0	6	1	1	1	0	0	3	0	0	0	2	1	0	1	4	24
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.13.
Question D.4a
Engine/bridge equipment failure procedure when in:
a) open sea

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

Table 5.14.
Question D.6
Stranding and beaching operations.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	3	0	1	4	1	0	1	0	0	0	0	0	0	0	0	5
undecided	4	0	0	4	0	0	0	2	0	2	1	1	1	0	1	8
agree	7	1	2	10	0	0	0	3	0	3	1	1	1	1	2	16
strongly agree	1	0	0	1	2	1	3	1	1	2	0	0	2	0	2	8
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	1	0	1	0	2	0	0	0	0	0	1	1	1	0	1	4
agree	2	1	0	1	4	0	0	1	1	2	1	1	0	3	3	10
strongly agree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read			opinion		none			
response	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	0	0	1	0	1	2	0	0	0	0	3
undecided	0	1	1	1	1	1	1	0	2	0	0	0	0	4
agree	1	1	2	1	1	2	0	0	2	0	0	0	0	5
strongly agree	0	1	1	2	2	0	0	0	0	1	1	1	1	5
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.82	1.00			
Oil	0.85	0.43	1.00		
Coastal	0.92	0.98	0.06	1.00	
General	0.94	0.84	0.80	0.90	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
disagree	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	1	1	2	4	
undecided	1	0	1	2	0	0	0	0	1	0	0	1	0	0	2	1	0	3	6	
agree	5	1	1	7	0	0	0	0	1	1	1	3	1	1	3	0	2	5	16	
strongly agree	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	2	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	2	0	3	0	0	0	0	0	1	1	6
disagree	0	1	5	0	2	8	0	0	2	1	0	3	1	0	1	0	1	3	0	0	0	0	0	1	1	15
undecided	3	1	2	1	3	10	0	0	5	2	0	7	0	1	1	3	1	6	1	1	0	1	2	1	0	4	28
agree	7	0	1	0	4	12	0	1	2	2	1	6	1	1	0	4	0	6	1	1	0	2	4	0	4	10	35
strongly agree	4	0	1	0	0	5	1	1	3	0	0	5	1	0	3	1	0	5	0	0	1	0	1	0	1	3	18
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.15.
Question D.7
Collision incidents.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	4	1	0	5	0	0	0	1	0	1	1	1	1	0	1	8
agree	7	0	2	9	1	1	2	4	1	5	0	0	0	1	1	17
strongly agree	4	0	1	5	2	0	2	1	0	1	1	1	3	0	3	12
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	1	1	0	0	0	0	0	0	0	0	3
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	3
agree	2	0	1	1	4	0	0	1	0	1	1	1	0	2	2	8
strongly agree	1	1	0	0	2	0	0	0	1	1	0	0	0	0	0	3
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	0	0	1	0	1	2	0	0	0	0	3
undecided	1	1	2	1	1	0	1	0	1	0	0	0	0	4
agree	0	2	2	1	1	3	0	0	3	0	0	1	1	7
strongly agree	0	0	0	2	2	0	0	0	0	1	1	0	0	3
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.82	1.00			
Oil	0.82	0.66	1.00		
Coastal	0.91	0.65	0.60	1.00	
General	0.98	0.67	0.79	0.94	1.00

REPRESENT	COASTAL SHIPPING																		
FAMILIAR	attended				visited				read				opinion		none				
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total
strongly disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	1	1	0	1	0	1	0	0	0	0	0	0	1	0	0	1	3
agree	1	1	1	3	0	0	0	0	2	0	0	2	1	1	2	1	2	5	11
strongly agree	4	0	0	4	1	0	0	1	1	1	1	3	0	0	2	1	1	4	12
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28

REPRESENT	GENERAL MERCHANT FLEET																										
FAMILIAR	attended						visited						read					opinion		none							
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	1	1	3
disagree	0	0	2	0	0	2	0	0	2	1	0	3	0	0	0	0	1	1	0	0	0	0	2	0	1	3	9
undecided	2	1	4	1	2	10	0	1	3	1	0	5	1	1	0	2	1	5	0	0	0	0	0	0	1	1	21
agree	5	1	2	0	6	14	0	0	4	2	0	6	2	0	1	5	0	8	2	2	0	1	2	1	2	6	36
strongly agree	7	0	3	0	1	11	1	1	3	1	1	7	1	1	4	1	0	7	0	0	1	2	3	0	2	8	33
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.12 continued

	SD	D	U	A	SA	mean	med.	st.dev.
6.Stranding and beaching operations	7	29	50	82	33	3.52	4	1.04
7.Collision incidents	7	13	39	79	63	3.88	4	1.04

6. Section E-Bridge Team-Work.

With the advancement of new technology in the marine industry, ship owners have been able to reduce the number of crew on their vessels. Consequently increased responsibility is being assigned to individual crew members with more emphasis being placed on team-work and cooperation between crew members. Team-work is defined by Webster's Ninth Collegiate dictionary 1989 p.1210, as "..work done by several associates with each doing a part but all subordinating personal prominence to the efficiency of the whole." Section E of the survey focused on the concept of team work aboard a ship and sought opinions on the appropriateness of training in this area using a ship handling simulator. The six questions in this section were specific to the operation of the navigating bridge, as the handling and manoeuvering of a vessel requires efficiency and the coordination of tasks by several crew members in addition the training was to be conducted utilizing a ship handling simulator. The responses to the questions for section E of the survey are shown in table 5.16. Questions #2.(b), #2.(c), and #6 addressed training in team-work for situations of emergency, unfamiliarity and pilotage procedures respectively for which there was a general agreement from the respondents to

the appropriateness of training for these areas utilizing a ship handling simulator. The remaining questions in section E of the survey received an increase in the number of undecided responses although in all of the questions, over 50% of those surveyed responded in agreement. Three questions, #1, #4, and #5, showed a high number of undecided and disagreed

TABLE 5.16
SUMMARY OF RESPONSES TO SECTION E. TEAM WORK

	SD	D	U	A	SA	mean	med.	st.dev.
1.Developing interpersonal relationships	7	25	52	72	45	3.61	4	1.07
2.Command training:								
(a)in routine circumstances	2	21	32	101	45	3.83	4	0.93
(b)in emergency circumstances	2	9	17	94	79	4.18	4	0.84
(c)in unfamiliar circumstances	1	12	24	87	77	4.13	4	0.88
3.Routine bridge procedures training	6	15	52	88	40	3.70	4	0.97
4.Developing of 'Standing Orders'	5	40	43	81	32	3.47	4	1.05
5.Working with unfamiliar crews	9	40	48	76	28	3.37	4	1.09
6.Developing pilotage procedures	4	16	24	113	44	3.88	4	0.90

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	2	0	1	3	0	0	0	2	0	2	0	0	1	0	1	**6**
undecided	4	0	0	4	1	0	1	3	0	3	1	1	1	1	2	**11**
agree	3	1	2	6	1	1	2	1	0	1	1	1	0	0	0	**10**
strongly agree	6	0	0	6	1	0	1	0	1	1	0	0	2	0	2	**10**
Total	**15**	**1**	**3**	**19**	**3**	**1**	**4**	**6**	**1**	**7**	**2**	**2**	**4**	**1**	**5**	**37**

Table 5.17.
Question E.1
Developing interpersonal relationships.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	**2**
disagree	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	**2**
undecided	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	**2**
agree	4	0	0	1	5	0	0	0	0	0	1	1	0	2	2	**8**
strongly agree	0	0	1	0	1	0	0	1	1	2	0	0	0	0	0	**3**
Total	**5**	**1**	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**1**	**3**	**4**	**17**

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	1	1	0	0	0	0	0	0	0	1	1	1	**2**
undecided	1	1	2	0	0	1	0	0	1	0	0	0	0	**3**
agree	0	0	0	2	2	2	1	0	3	1	1	0	0	**6**
strongly agree	0	2	2	2	2	1	0	1	2	0	0	0	0	**6**
Total	**1**	**4**	**5**	**4**	**4**	**4**	**1**	**1**	**6**	**1**	**1**	**1**	**1**	**17**

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.38	1.00			
Oil	0.82	0.67	1.00		
Coastal	0.79	0.64	0.66	1.00	
General	0.86	0.77	0.83	0.92	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**	
disagree	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	
undecided	1	0	0	1	0	0	1	1	1	1	0	2	1	1	2	2	1	5	**10**	
agree	3	1	0	4	0	0	0	0	2	0	1	3	0	0	3	0	1	4	**11**	
strongly agree	2	0	1	3	1	1	0	2	0	0	0	0	0	0	0	0	0	0	**5**	
Total	**6**	**1**	**2**	**9**	**1**	**1**	**1**	**3**	**3**	**1**	**1**	**5**	**1**	**1**	**5**	**2**	**3**	**10**	**28**	

REPRESENT	GENERAL MERCHANT FLEET																										
FAMILIAR	attended						visited						read					opinion		none							
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	0	0	0	1	0	0	0	0	0	0	2	0	0	1	0	3	0	0	0	0	0	0	0	0	**4**
disagree	2	0	2	0	4	8	0	0	1	1	0	2	0	0	0	0	1	1	0	0	0	1	1	0	1	3	**14**
undecided	3	1	1	1	2	8	1	0	1	3	0	5	0	1	2	4	0	7	1	1	0	1	3	0	1	5	**26**
agree	6	0	3	0	1	10	0	2	5	0	0	7	2	1	1	5	1	10	1	1	0	1	3	1	4	9	**37**
strongly agree	3	0	5	0	2	10	0	0	5	1	1	7	0	0	2	0	0	2	0	0	1	0	0	0	1	2	**21**
Total	**14**	**2**	**11**	**1**	**9**	**37**	**1**	**2**	**12**	**5**	**1**	**21**	**4**	**2**	**5**	**10**	**2**	**23**	**2**	**2**	**1**	**3**	**7**	**1**	**7**	**19**	**102**

Table 5.18.
Question E.4
Developing of standing orders.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	2	0	1	3	0	0	0	1	0	1	1	1	0	1	1	6
undecided	4	1	0	5	1	1	2	1	0	1	0	0	1	0	1	9
agree	5	0	2	7	0	0	0	3	1	4	1	1	1	0	1	13
strongly agree	4	0	0	4	2	0	2	1	0	1	0	0	2	0	2	9
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2
undecided	0	0	0	0	0	1	1	0	1	1	0	0	0	1	1	3
agree	3	1	1	1	6	0	0	1	0	1	0	0	1	1	2	9
strongly agree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	1	1	1	0	1	2	0	0	0	0	4
undecided	0	0	0	0	0	0	0	0	0	0	0	1	1	1
agree	1	3	4	1	1	2	0	0	2	1	1	0	0	8
strongly agree	0	0	0	2	2	1	1	0	2	0	0	0	0	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.88	1.00			
Oil	0.78	0.88	1.00		
Coastal	0.88	0.95	0.70	1.00	
General	0.78	0.84	0.79	0.81	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	2		
undecided	1	0	0	1	0	1	0	1	1	0	1	2	1	1	1	1	1	3	8		
agree	4	1	2	7	0	0	0	0	1	1	0	2	0	0	3	0	2	5	14		
strongly agree	1	0	0	1	1	0	0	1	1	0	0	1	0	0	1	0	0	1	4		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																									
FAMILIAR	attended						visited						read					opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage'	education	student	govern'	total	Grand total
strongly disagree	0	0	0	0	1	1	0	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	1	0	1	2	5
disagree	3	1	4	0	2	10	0	1	3	1	0	5	1	0	1	4	0	6	0	0	0	2	2	0	1	5	26
undecided	2	0	3	1	1	7	0	0	3	0	0	3	2	0	1	4	1	8	0	0	0	0	2	0	2	4	22
agree	7	1	1	0	4	13	0	1	5	2	1	9	0	2	3	2	1	8	1	1	1	1	2	0	2	6	37
strongly agree	2	0	3	0	1	6	1	0	1	1	0	3	0	0	0	0	0	0	1	1	0	0	0	1	1	2	12
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.19.
Question E.5
Working with unfamiliar crew.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
disagree	3	0	1	4	0	0	0	1	0	1	0	0	0	1	1	6
undecided	2	1	0	3	0	0	0	2	0	2	0	0	1	0	1	6
agree	7	0	2	9	1	1	2	2	0	2	2	2	1	0	1	16
strongly agree	3	0	0	3	2	0	2	1	0	1	0	0	2	0	2	8
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2
disagree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
undecided	1	0	0	0	1	0	0	0	1	1	1	1	0	1	1	4
agree	0	1	1	1	3	0	0	1	0	1	0	0	1	2	3	7
strongly agree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	1	1	1	0	1	2	0	0	0	0	4
undecided	1	0	1	0	0	0	0	0	0	0	0	1	1	2
agree	0	3	3	1	1	2	0	0	2	1	1	0	0	7
strongly agree	0	0	0	2	2	1	1	0	2	0	0	0	0	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.76	1.00			
Oil	0.95	0.63	1.00		
Coastal	0.91	0.90	0.82	1.00	
General	0.75	0.89	0.68	0.95	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	
disagree	0	0	0	0	0	0	1	1	1	0	0	1	0	0	2	1	0	3	5	
undecided	2	0	0	2	0	0	0	0	1	0	1	2	1	1	1	0	1	2	7	
agree	3	1	2	6	0	1	0	1	0	1	0	1	0	0	2	0	1	3	11	
strongly agree	1	0	0	1	1	0	0	1	1	0	0	1	0	0	0	0	1	1	4	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																									
FAMILIAR	attended						visited						read					opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	1	1	0	2	1	0	0	1	0	2	0	0	0	0	0	0	0	5
disagree	2	1	4	0	2	9	0	0	2	0	0	2	1	0	1	3	0	5	0	0	0	2	2	0	2	6	22
undecided	4	1	0	1	2	8	0	1	5	2	0	8	2	0	0	2	2	6	0	0	0	0	2	1	4	7	29
agree	6	0	4	0	4	14	0	0	3	1	1	5	0	2	4	4	0	10	2	2	0	1	3	0	0	4	35
strongly agree	2	0	2	0	1	5	1	1	1	1	0	4	0	0	0	0	0	0	0	0	1	0	0	0	1	2	11
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

responses and are cross-tabulated as shown in tables 5.17, 5.18, and 5.19 respectively

7. Section F-Offshore Petroleum Industry.

The operational sea going sector of the offshore petroleum industry declined during the past eight years in both the northern and eastern sea areas of Canada. Nevertheless renewed activity is predicted in both areas more specifically off the east coast of Newfoundland. Of the 201 respondents to the survey only 17 returns represented this sector of the industry. The responses to the 10 questions indicted appropriateness of training using a simulator facility for all of the questions as shown in table 5.20. A high number of returns were recorded in the undecided category for each question. The questions within this section are very industry sector specific which may account for the high undecided responses. A cross tabulation for each question was completed using the same variables as with previous sections. These questions are sector specific as a consequence only the responses from those mariners representing the industry where cross tabulated. Correlation values were calculated for each question using the totals from the sector responses and the total from the overall responses and is shown in tables 5.21. The correlation for question #3 was lower than for the other questions at a value of 0.44. The disparity was in the strongly agree category were 10 (59%) of the 17 sector mariners selected this response and only 59 (29%) of the total 201 respondents selected strongly agree. The respondents from within the oil sector who had attended or visited a simulator responded as either agreed or undecided in all question with the exception of #8 where one

disagree response was recorded.

TABLE 5.20
SUMMARY OF RESPONSES TO SECTION F
OFFSHORE PETROLEUM INDUSTRY

	SD	D	U	A	SA	mean	med.	st.dev.
1.Holding station by a standby vessel	3	17	60	87	34	3.66	4	0.90
2.On location operations for a standby vessel	1	16	65	91	28	3.64	4	0.83
3.Manoeuvring close to rigs by a standby vessel	2	7	50	83	59	3.94	4	0.88
4.Rig/Drill platform evacuation by a standby vessel	1	14	78	64	44	3.67	4	0.91
5.Drillship/support vessel interaction	2	6	68	92	33	3.73	4	0.80
6.Anchor handling by a standby vessel	4	19	73	71	34	3.55	4	0.94
7.Towing of drilling rigs	3	21	73	69	35	3.55	4	0.94
8.Watchkeeping aboard drillships/platforms	5	28	79	68	21	3.36	3	0.93
9.Dynamic positioning systems and operations	1	10	69	86	35	3.71	4	0.82
10.Engine thruster and multi functional control systems operations	0	6	59	84	52	3.90	4	0.81

Table 5.21 Responses to section F from those representing the oil exploration industry

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	eduction	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	1	0	0	1	0	0	0	0	1
disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
undecided	0	1	1	0	0	0	0	0	0	0	0	0	0	1
agree	1	1	2	2	2	2	1	0	3	0	0	1	1	8
strongly agree	0	2	2	2	2	1	0	0	1	1	1	0	0	6
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Question F.1
Holding station by a standby vessel.
Overall response
SD D U A SA
3 17 60 87 34
correlation 0.65

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	0	0	0	2	2	0	0	0	0	0	0	0	0	2
agree	1	4	5	0	0	3	1	1	5	0	0	1	1	11
strongly agree	0	0	0	2	2	1	0	0	1	1	1	0	0	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Question F.2
On location operations of a standby vessel.
Overall response
SD D U A SA
1 16 65 91 28
correlation 0.83

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	2	0	0	2	0	0	0	0	2
undecided	0	1	1	1	1	0	1	0	1	0	0	0	0	3
agree	0	0	0	1	1	1	0	0	1	0	0	0	0	2
strongly agree	1	3	4	2	2	1	0	1	2	1	1	1	1	10
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Question F.3
Manoeuvering close to rigs by a standby vessel.
Overall response
SD D U A SA
2 7 50 83 59
correlation 0.44

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	1	0	0	1	0	0	0	0	1
undecided	0	1	1	2	2	1	0	0	1	0	0	0	0	4
agree	1	3	4	1	1	1	0	1	2	0	0	0	0	7
strongly agree	0	0	0	2	2	0	0	0	0	1	1	1	1	4
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Question F.4
Rig/drill platform evacuation by a standby vessel.
Overall response
SD D U A SA
1 14 78 64 44
correlation 0.92

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree		0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	1	1	2	2	2	1	1	0	2	0	0	0	0	6
agree	0	3	3	0	0	3	0	1	4	1	1	1	1	9
strongly agree	0	0	0	2	2	0	0	0	0	0	0	0	0	2
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Question F.5
Drillship/support vessel interaction.
Overall response
SD D U A SA
2 6 68 92 33
correlation 0.99

Table 5.21 continued

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	1	0	0	1	0	0	0	0	**1**
undecided	0	2	2	2	2	1	1	0	2	0	0	0	0	**6**
agree	0	2	2	0	0	2	0	1	3	0	0	1	1	**6**
strongly agree	1	0	1	2	2	0	0	0	0	1	1	0	0	**4**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Question F.6
Anchor handling by a standby vessel.
Overall response

SD	D	U	A	SA
4	19	73	71	34

correlation 0.97

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	2	2	0	0	1	0	0	1	0	0	0	0	**3**
agree	0	2	2	2	2	3	0	0	3	1	1	0	0	**8**
strongly agree	1	0	1	2	2	0	1	1	2	0	0	1	1	**6**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Question F.7
Towing of drilling rigs.
Overall response

SD	D	U	A	SA
3	21	73	69	35

correlation 0.69

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	1	1	0	0	0	0	0	0	0	0	0	0	**1**
undecided	1	0	1	0	0	0	0	1	1	0	0	1	1	**3**
agree	0	3	3	2	2	4	0	0	4	1	1	0	0	**10**
strongly agree	0	0	0	2	2	0	1	0	1	0	0	0	0	**3**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Question F.8
Watchkeeping aboard drillships/platforms.
Overall response

SD	D	U	A	SA
5	28	79	68	21

correlation 0.65

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	0	0	1	1	0	0	0	0	0	0	0	0	**1**
agree	1	3	4	1	1	3	0	1	4	1	1	0	0	**10**
strongly agree	0	1	1	2	2	1	1	0	2	0	0	1	1	**6**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Question F.9
Dynamic positioning systems and operations.
Overall response

SD	D	U	A	SA
1	10	69	86	35

correlation 0.70

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	0	0	1	1	0	0	0	0	0	0	0	0	**2**
agree	1	2	3	1	1	3	0	1	4	0	0	0	0	**8**
strongly agree	0	2	2	2	2	1	1	0	2	0	0	1	1	**7**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Question F.10
Engine thruster and multi functional control systems operation.
Overall response

SD	D	U	A	SA
0	6	59	84	52

correlation 0.85

8. Section G-Fishing.

The fishing sector of the marine industry is very difficult to define as vessels range in size from open boat to factory trawlers and the economy is driven by both local and international markets. Further the operational size of the fishing companies, another defining element, differs with dependence on various factors such as economics, fishing grounds and species being hunted. The survey did not attempt to cover all aspects of these sectors and by limiting those surveyed to fishermen with marine certificates, the opinions of fishermen without formal qualifications were excluded. The exclusion of this group does not imply that training on a simulator would be unnecessary for them nor that their opinions would be invalid.

The situation with the fishing sector was very similar to that of the offshore exploration sector. The past few years has seen a decline in the number of fishermen involved in the industry which may account for only 17 returns being recorded for this sector. The summary of responses by this section are shown in table 5.22 which displays a high number of undecided responses to all questions. For each of the Questions #1.(a), #1.(b), #1.(c), #1.(e), and #5 there was 50% of the 201 responses recorded as undecided. These responses are inconsistent with responses to questions in other sections of the questionnaire and reflect limited knowledge of the fishing industry by those surveyed.

TABLE 5.22
SUMMARY OF RESPONSES TO SECTION G. FISHING

	SD	D	U	A	SA	mean	med.	st.dev.
1.Ship handling skills when:								
a) shooting fishing gear	4	18	101	60	18	3.34	3	0.84
(b) hauling fishing gear	4	17	104	57	19	3.34	3	0.84
(c) towing fishing gear	3	17	100	59	22	3.39	3	0.84
(d) towing fishing gear in a collision situation	2	16	87	58	38	3.56	3	0.92
(e) operating in ice while towing fishing gear	4	19	101	49	28	3.38	3	0.91
2.Ship handling on various types of vessels:								
(a) small fishing vessels	3	19	73	81	25	3.52	4	0.88
(b) stern trawlers	2	7	71	93	28	3.68	4	0.79
(c) purse seiners	2	10	77	85	27	3.62	4	0.81
3.Fish detection and hunting	4	23	97	55	22	3.33	3	0.89
4.Integrated electronic equipment systems operation and use	1	9	72	79	40	3.73	4	0.84
5.Fishing team procedures	2	18	101	53	27	3.42	3	0.87

Table 5. 23. Responses to section G made by those representing the fishing industry

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
agree	2	0	1	1	4	1	1	1	1	2	1	1	1	2	3	11
strongly agree	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

Question G.1a
Ship handling skills when:
a)shooting fishing gear.
Overall response

SD	D	U	A	SA
4	18	101	60	18

correlation 0.18

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	1	0	1	0	0	0	0	0	1	1	0	1	1	3
agree	2	0	0	1	3	1	1	1	1	2	0	0	1	2	3	9
strongly agree	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

Question G.1b
b) hauling fishing gear.
Overall response

SD	D	U	A	SA
4	17	104	57	19

correlation 0.35

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	2
agree	1	0	0	1	2	1	1	0	1	1	1	1	1	2	3	8
strongly agree	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

Question G.1c
c) towing fishing gear.
Overal response

SD	D	U	A	SA
3	17	100	59	22

correlation 0.18

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
agree	0	0	0	1	1	0	0	0	0	0	1	1	0	3	3	5
strongly agree	1	1	1	0	3	1	1	1	1	2	0	0	0	0	0	6
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

Question G.1d
d) towing fishing gear in a collision situation.
Overall response

SD	D	U	A	SA
2	16	87	58	38

correlation 0.17

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	3
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
agree	1	0	0	1	2	1	1	1	0	1	1	1	0	3	3	8
strongly agree	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	2

Question G.1e
e) operating in ice while towing fishing gear.
Overall response

SD	D	U	A	SA
4	19	101	49	28

correlation 0.04

Table 5.23 continued

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	1	1	3
undecided	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
agree	3	1	1	0	5	0	0	0	1	1	1	1	1	2	3	10
strongly agree	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

Question G.2a
Ship handling on:
2a) small fishing vessels.
Overall response

SD	D	U	A	SA
3	19	73	81	25

correlation 0.55

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	2
agree	3	1	1	0	5	1	1	0	1	1	1	1	1	2	3	11
strongly agree	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

Question G.2b
2b) stern trawlers.
Overall response

SD	D	U	A	SA
2	7	71	93	28

correlation 0.76

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	gover'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	2
agree	2	1	1	0	4	1	1	0	1	1	1	1	1	2	3	10
strongly agree	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

Question G.2c
2c)purse seiners
Overall response

SD	D	U	A	SA
2	10	77	85	27

correlation 0.65

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	1	0	1	1	3	1	1	1	1	2	1	1	0	1	1	8
agree	1	0	0	0	1	0	0	0	0	0	0	0	1	2	3	4
strongly agree	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

Question G.3
Fish detecting and hunting.
Overall response

SD	D	U	A	SA
4	23	97	55	22

correlation 0.95

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2
undecided	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
agree	1	0	1	1	3	1	1	0	1	1	0	0	1	2	3	8
strongly agree	1	1	0	0	2	0	0	1	0	1	1	1	0	0	0	4
Total	5	1	1	1	**8**	1	1	1	1	2	2	2	1	3	4	17

Question G.4
Integrated electronic equipment sytems.
Overall response

SD	D	U	A	SA
1	9	72	79	40

correlation 0.69

Table 5.23 continued

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
disagree	2	0	0	0	2	0	0	0	1	1	0	0	0	0	0	3
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
agree	2	1	1	1	5	1	1	1	0	1	0	0	1	1	2	9
strongly agree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
Total	5	1	1	1	**8**	1	**1**	1	1	**2**	2	**2**	1	3	**4**	17

Question G.5
Fishing team procedures.
Overall response

SD	D	U	A	SA
2	18	101	53	27

correlation 0.21

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2
undecided	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
agree	3	1	1	1	6	0	0	0	1	1	0	0	1	2	3	10
strongly agree	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	2
Total	5	1	1	1	**8**	1	**1**	1	1	**2**	2	**2**	1	3	**4**	17

Question G.6
Coming along side another vessel.
Overall response

SD	D	U	A	SA
4	13	57	90	37

correlation 0.74

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2
disagree	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
agree	2	0	0	0	2	0	0	0	0	0	1	1	1	3	4	7
strongly agree	0	0	1	1	2	0	0	1	1	2	1	1	0	0	0	5
Total	5	1	1	1	**8**	1	**1**	1	1	**2**	2	**2**	1	3	**4**	17

Question G.7
Operating/manoeuvring when iced up.
Overall response

SD	D	U	A	SA
3	11	84	60	43

correlation 0.19

Table 5.22 continued

	SD	D	U	A	SA	mean	med.	st.dev.
6.Coming alongside another vessel	4	13	57	90	37	3.71	4	0.90
7.Operating/manoeuvring when iced up	3	11	84	60	43	3.64	4	0.92

Due to the very specific nature of this sector of the industry, the cross tabulation for each question in this section of the questionnaire was restricted to the responses made by those identifying with the fishing industry. The correlation values shown on table 5.23 were derived by using the total from the sector responses and the total from the overall responses. The five sections of question #1 are related to ship handling during the fishing operation. There was little correlation between the opinions of the fishermen and the opinions of the total responses to these questions as well as question #5, fishing team procedures. The fishermen generally agreed with the training where as the overall responses indicated a high level of indecision. This indecision would indicate a lack of knowledge with the fishing industry or doubt as to the appropriateness of such training using a ship handling simulator. Low correlation was recorded for question #7, again the fishing group agreed with the training and a relatively high number, 84 (42%), of the 201 respondents were undecided. The remaining questions showed a higher correlation between fishermen and the overall respondents although there were a large number of undecided returns.

9. Section H-Navigation in Ice

Operating and navigating in ice are very specialized skills largely acquired through experience. Although the professional qualifications of mariners includes the study of ice navigation this is limited to theoretical knowledge. The coast lines of Canada are subjected to seasonal ice conditions particularly the northern and eastern sea areas. Relatively little data is available on the characteristics of ice and it's effects on navigation. Consequently this section of the questionnaire was addressing future training on a ship handling simulator.

Respondents were asked how appropriate training on a ship handling simulator would be, given that the simulator was capable of simulating ice conditions. The questions presented to the respondents were similar to questions in sections B and C of the questionnaire. In addition questions specific to navigation in ice such as ice identification were included. The data presented in table 5.24 summarises the total responses to the questions in section H of the survey.

TABLE 5.24
SUMMARY OF RESPONSES TO SECTION H. NAVIGATION IN ICE

	SD	D	U	A	SA	*mean*	*med*	*st.dev.*
1.Detection and identification of various ice forms	12	34	54	79	22	3.32	4	1.06
2.Passage planning and execution of passage in ice	6	27	42	89	37	3.61	4	1.02
3.Sighting and reporting ice	12	32	54	81	22	3.34	4	1.06

Table 5.24 continued

	SD	D	U	A	SA	mean	med	st.dev.
4.Navigation in ice by:								
(a) day	5	21	49	98	28	3.61	4	0.93
(b) night	7	20	53	86	35	3.60	4	1.00
(c) restricted/weather conditions	9	16	45	87	44	3.70	4	1.04
5.Shiphandling in various ice conditions	5	16	51	84	45	3.73	4	0.97
6.Ice breaking and associated tasks (path making/following)	5	22	57	75	42	3.63	4	1.01
7.Collision avoidance in ice	5	15	40	91	50	3.82	4	0.97
8.Anchorage/berthing in ice	6	20	43	90	42	3.70	4	1.00
9.Confined navigation in ice	6	12	42	95	46	3.81	4	0.95

Consistent with responses in sections F and G of the questionnaire there was a high number of undecided responses indicating either a lack of knowledge in the area of ice navigation or indecision as to the suitability of this form of training using a ship handling simulator. The data in table 5.24 indicates a dispersion of data across the agreement scale as to the appropriateness of this form of training for all of the questions, however the level of agreement is low as was the case in sections F and G of the questionnaire. In questions were the responses had a standard deviation greater than 1.00 the data was cross tabulated and displayed in tables 5.25, 5.26, 5.27, 5.28, 5.29, 5.30, and 5.31. The correlation values between group totals were displayed for each question.

Table 5.25.
Question H.1
Detection and identification of various ice forms.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	ducation	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
disagree	1	0	0	1	1	0	1	1	0	1	0	0	0	0	0	3
undecided	3	0	2	5	0	0	0	1	1	2	0	0	1	0	1	8
agree	8	1	1	10	1	0	1	4	0	4	2	2	1	1	2	19
strongly agree	2	0	0	2	1	1	2	0	0	0	0	0	2	0	2	6
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2
undecided	2	1	0	0	3	0	0	1	0	1	1	1	0	1	1	6
agree	2	0	0	0	2	0	0	0	0	0	0	0	1	2	3	5
strongly agree	0	0	1	1	2	0	0	0	1	1	0	0	0	0	0	3
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read			opinion		none			
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
disagree	0	2	2	0	0	0	0	0	0	0	0	0	0	2
undecided	0	1	1	1	1	0	0	1	1	1	1	0	0	4
agree	1	1	2	1	1	3	1	0	4	0	0	1	1	8
strongly agree	0	0	0	2	2	0	0	0	0	0	0	0	0	2
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.72	1.00			
Oil	0.98	0.74	1.00		
Coastal	0.84	0.81	0.91	1.00	
General	0.82	0.77	0.89	0.99	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1		
disagree	1	0	1	2	0	0	0	0	1	0	0	1	0	0	1	0	1	2	5		
undecided	0	0	0	0	0	1	0	1	2	1	0	3	1	1	2	0	2	4	9		
agree	5	1	1	7	0	0	0	0	0	0	1	1	0	0	2	2	0	4	12		
strongly agree	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited					read					opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	2	0	0	3	0	0	1	2	0	3	1	0	0	1	0	2	0	0	0	0	0	0	0	8
disagree	3	0	4	0	3	10	0	1	2	1	0	4	0	0	2	2	0	4	0	0	0	0	2	0	2	4	22
undecided	4	0	3	1	1	9	0	0	2	1	0	3	1	0	3	2	1	7	1	1	1	0	3	0	3	7	27
agree	4	1	2	0	5	12	0	0	4	0	1	5	2	2	0	5	1	10	1	1	0	3	1	1	2	7	35
strongly agree	3	0	0	0	0	3	1	1	3	1	0	6	0	0	0	0	0	0	0	0	0	0	1	0	0	1	10
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	1	102

Table 5.26.
Question H.2
Passage planning and execution of passage in ice.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	**2**
undecided	3	0	2	5	0	0	0	1	1	2	0	0	1	1	2	**9**
agree	9	1	1	11	1	0	1	4	0	4	2	2	1	0	1	**19**
strongly agree	2	0	0	2	2	1	3	0	0	0	0	0	2	0	2	**7**
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	**37**

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	**1**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	1	1	0	0	2	0	0	1	0	1	1	1	0	0	0	**4**
agree	4	0	0	0	4	1	1	0	1	1	0	0	1	3	4	**10**
strongly agree	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	**2**
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	**17**

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	1	1	0	0	0	0	1	1	0	0	0	0	**2**
undecided	0	0	0	0	0	1	0	0	1	0	0	0	0	**1**
agree	1	3	4	2	2	3	1	0	4	0	0	1	1	**11**
strongly agree	0	0	0	2	2	0	0	0	0	1	1	0	0	**3**
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	**17**

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.97	1.00			
Oil	0.90	0.89	1.00		
Coastal	0.97	0.94	0.92	1.00	
General	0.87	0.76	0.81	0.78	1.00

REPRESENT	COASTAL SHIPPING																		
FAMILIAR	attended				visited				read				opinion		none				
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	**1**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**
undecided	0	0	1	1	0	1	0	1	0	0	0	0	1	1	1	0	1	2	**5**
agree	4	1	1	6	0	0	0	0	2	0	1	3	0	0	3	1	1	5	**14**
strongly agree	2	0	0	2	1	0	0	1	1	1	0	2	0	0	1	1	0	2	**7**
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	**28**

REPRESENT	GENERAL MERCHANT FLEET																									
FAMILIAR	attended						visited						read						opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	1	0	2	0	0	0	0	0	0	0	0	**4**
disagree	3	1	2	0	2	8	0	1	3	2	0	6	0	0	2	2	0	4	0	0	0	1	0	0	3	4	**22**
undecided	3	1	6	0	2	12	0	0	0	0	0	0	2	1	0	3	1	7	1	1	0	0	3	0	0	3	**23**
agree	3	0	1	1	4	9	0	6	6	1	0	7	1	1	2	4	1	9	1	1	1	1	3	1	3	9	**35**
strongly agree	5	0	1	0	1	7	1	1	3	1	1	7	0	0	1	0	0	1	0	0	0	1	1	0	1	3	**18**
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	**102**

Table 5.27.
Question H.3
Sighting and reporting ice.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none				
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	2	0	0	2	0	0	0	1	0	1	0	0	0	0	0	3
undecided	4	0	2	6	1	0	1	1	0	1	0	0	1	1	2	10
agree	8	1	1	10	1	1	2	4	1	5	2	2	1	0	1	20
strongly agree	1	0	0	1	1	0	1	0	0	0	0	0	2	0	2	4
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended				visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	2
disagree	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2
undecided	1	1	0	0	2	0	0	1	1	2	1	1	0	0	0	5
agree	2	0	1	0	3	0	0	0	0	0	0	0	1	3	4	7
strongly agree	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
disagree	0	1	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	2	2	1	1	1	0	0	1	0	0	0	0	4
agree	1	1	2	1	1	3	1	0	4	1	1	0	0	8
strongly agree	0	0	0	2	2	0	0	0	0	0	0	1	1	3
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.93	1.00			
Oil	0.98	0.89	1.00		
Coastal	1.00	0.95	0.97	1.00	
General	0.82	0.83	0.69	0.81	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1		
disagree	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	2		
undecided	0	0	1	1	0	1	0	1	1	0	1	2	1	1	1	1	1	3	8		
agree	5	1	1	7	0	0	0	0	1	1	0	2	0	0	3	1	1	5	14		
strongly agree	1	0	0	1	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																										
FAMILIAR	attended						visited						read						opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	1	2	0	0	3	0	0	1	1	0	2	1	0	0	1	0	2	0	0	0	0	1	0	0	1	8
disagree	4	0	5	0	3	12	0	0	3	3	0	6	0	0	1	2	0	3	0	0	0	0	1	0	2	3	24
undecided	3	1	2	1	2	9	0	0	2	0	0	2	1	1	2	3	2	9	1	1	0	0	3	0	3	6	27
agree	5	0	1	0	4	10	0	1	4	0	1	6	2	1	1	4	0	8	1	1	0	3	1	1	2	7	32
strongly agree	2	0	1	0	0	3	1	1	2	1	0	5	0	0	1	0	0	1	0	0	1	0	1	0	0	2	11
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

Table 5.28.

Question H. 4b

Navigating in ice by:
b) night.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	**2**
undecided	3	0	1	4	0	0	0	1	0	1	0	0	1	0	1	**6**
agree	9	1	1	11	1	0	1	4	0	4	2	2	1	1	2	**20**
strongly agree	2	0	0	2	2	1	3	1	1	2	0	0	2	0	2	**9**
Total	15	1	3	**19**	3	1	**4**	6	1	**7**	2	**2**	4	1	**5**	**37**

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	**1**
disagree	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	**1**
undecided	1	1	0	0	2	0	0	1	0	1	1	1	0	1	1	**5**
agree	4	0	0	1	5	0	0	0	1	1	0	0	1	2	3	**9**
strongly agree	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Total	5	1	1	1	**8**	1	**1**	1	1	**2**	2	**2**	1	3	**4**	**17**

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read				opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	1	1	1	1	3	0	0	3	0	0	0	0	**5**
agree	1	2	3	1	1	1	1	1	3	0	0	1	1	**8**
strongly agree	0	1	1	2	2	0	0	0	0	1	1	0	0	**4**
Total	1	4	5	4	**4**	4	1	1	**6**	1	**1**	1	**1**	**17**

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.85	1.00			
Oil	0.93	0.88	1.00		
Coastal	0.91	0.98	0.96	1.00	
General	0.84	0.91	0.92	0.96	1.00

REPRESENT	COASTAL SHIPPING																		
FAMILIAR	attended				visited				read				opinion		none				
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	edcation	govern'	total	Grand total
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	**1**
disagree	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	**2**
undecided	2	0	0	2	0	1	0	1	1	0	0	1	1	1	2	0	1	3	**8**
agree	2	1	1	4	0	0	0	0	1	1	1	3	0	0	3	2	1	6	**13**
strongly agree	2	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	1	1	**4**
Total	6	1	2	**9**	1	1	1	**3**	3	1	1	**5**	1	**1**	5	2	3	**10**	**28**

REPRESENT	GENERAL MERCHANT FLEET																													
FAMILIAR	attended						visited						read						opinion		none						
response	seagoing	manage'	educaticn	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	1	1	3	0	0	0	0	0	0	0	0	**5**
disagree	3	0	2	0	2	7	0	0	2	2	0	4	0	0	0	3	0	3	0	0	0	0	1	0	0	1	**15**
undecided	5	1	6	1	2	15	0	1	1	1	0	3	1	1	0	2	0	4	1	1	0	0	3	0	3	6	**29**
agree	1	1	1	0	5	8	0	0	5	0	1	6	2	1	4	4	1	12	1	1	0	2	2	1	4	9	**36**
strongly agree	5	0	1	0	0	6	1	1	4	1	0	7	0	0	1	0	0	1	0	0	1	1	1	0	0	3	**17**
Total	14	2	11	1	9	37	1	2	12	5	1	**21**	4	2	5	10	2	**23**	2	**2**	1	3	7	1	7	**19**	**102**

Table 5.29.
Question H. 4c
Navigation in ice by:
c) restricted/weather condition.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1
undecided	3	0	1	4	0	0	0	1	0	1	0	0	1	0	1	6
agree	8	1	1	10	1	0	1	4	0	4	2	2	1	1	2	19
strongly agree	*4*	*0*	*0*	*4*	*2*	*1*	*3*	*1*	*1*	*2*	*0*	*0*	*2*	*0*	*2*	*11*
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	2
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
undecided	1	1	0	0	2	0	0	0	0	0	1	1	0	0	0	3
agree	4	0	0	0	4	0	0	1	1	2	0	0	1	2	3	9
strongly agree	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	2
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	*total*	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	0	1	1	1	1	3	0	0	3	0	0	0	0	5
agree	1	2	3	1	1	0	0	1	1	0	0	1	1	6
strongly agree	0	1	1	2	2	1	1	0	2	1	1	0	0	6
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.86	1.00			
Oil	0.86	0.58	1.00		
Coastal	0.96	0.85	0.92	1.00	
General	0.91	0.91	0.77	0.94	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	*total*	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	*total*	Grand total		
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1		
disagree	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
undecided	1	0	0	1	0	1	0	1	1	0	0	1	1	1	2	0	1	3	7		
agree	2	1	1	4	0	0	0	0	1	1	1	3	0	0	3	1	1	5	12		
strongly agree	3	0	0	3	1	0	0	1	1	0	0	1	0	0	0	1	1	2	7		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	*seagoing*	manage'	education	govern'	other	*total*	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	1	1	3	0	0	0	1	0	0	0	1	6
disagree	2	0	1	0	1	4	0	0	3	2	0	5	1	0	0	3	0	4	0	0	0	0	0	0	0	0	13
undecided	6	0	7	1	1	15	0	0	0	1	0	1	0	0	0	1	0	1	1	1	0	1	3	0	2	6	24
agree	*1*	*2*	*1*	*0*	*7*	*11*	*0*	*1*	*5*	*0*	*1*	*7*	*2*	*2*	*3*	*5*	*1*	*13*	*1*	*1*	*0*	*0*	*3*	*1*	*5*	*9*	*41*
strongly agree	5	0	1	0	0	6	1	1	4	1	0	7	0	0	2	0	0	2	0	0	1	1	1	0	0	3	18
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

RI" RESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	**2**
undecided	5	0	1	6	0	0	0	1	1	2	0	0	1	0	1	**9**
agree	7	0	1	8	0	0	0	4	0	4	2	2	1	1	2	**16**
strongly agree	3	1	0	4	2	1	3	1	0	1	0	0	2	0	2	**10**
Total	15	1	3	**19**	3	1	**4**	6	1	7	2	**2**	4	1	**5**	**37**

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
undecided	2	1	0	0	3	1	1	0	0	0	1	1	0	1	1	**6**
agree	2	0	1	0	3	0	0	1	0	1	1	1	1	2	3	**8**
strongly agree	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	**2**
Total	5	1	1	1	**8**	1	**1**	1	1	**2**	2	**2**	1	3	**4**	**17**

Table 5. 30.
Question H.6
Ice breaking and associated tasks (path making/following).

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
undecided	0	0	0	2	2	1	1	0	2	0	0	0	0	**4**
agree	0	3	3	0	0	3	0	1	4	0	0	1	1	**8**
strongly agree	1	1	2	2	2	0	0	0	0	1	1	0	0	**5**
Total	1	4	**5**	4	4	4	1	1	**6**	1	1	1	1	**17**

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.88	1.00			
Oil	0.99	0.85	1.00		
Coastal	0.81	0.87	0.77	1.00	
General	0.91	0.95	0.86	0.90	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	**1**		
disagree	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	**3**		
undecided	2	0	0	2	0	1	0	1	1	0	0	1	1	1	3	0	2	5	**10**		
agree	2	1	1	4	0	0	0	0	2	0	0	2	0	0	0	1	1	2	**8**		
strongly agree	1	0	0	1	1	0	0	1	0	1	1	2	0	0	2	0	0	2	**6**		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	**28**		

REPRESENT	GENERAL MERCHANT FLEET																									
FAMILIAR	attended						visited						read					opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	1	1	2	0	0	0	0	0	0	0	**4**
disagree	3	0	1	0	2	6	0	1	2	1	0	4	0	0	1	2	0	3	1	1	0	1	1	0	0	2	**16**
undecided	5	1	7	1	2	16	0	0	3	1	0	4	1	1	0	3	0	5	0	0	0	0	1	0	2	3	**28**
agree	3	1	0	0	5	9	0	0	3	1	0	4	3	1	2	4	1	11	1	1	0	2	3	1	4	10	**35**
strongly agree	3	0	2	0	0	5	1	1	4	1	1	8	0	0	2	0	0	2	0	0	1	0	2	0	1	4	**19**
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	**102**

Table 5. 31.
Question H.8
Anchoring/berthing in ice.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	2
undecided	1	0	1	2	0	0	0	2	0	2	0	0	1	1	2	6
agree	9	0	2	11	0	0	0	3	1	4	2	2	0	0	0	17
strongly agree	4	1	0	5	2	1	3	1	0	1	0	0	3	0	3	12
Total	15	1	3	**19**	3	1	**4**	6	1	7	2	**2**	4	1	**5**	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	1	0	0	1	1	1	0	0	0	1	1	0	0	0	3
agree	3	0	0	1	4	0	0	1	0	1	1	1	1	2	3	9
strongly agree	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	2
Total	5	1	1	1	**8**	1	**1**	1	1	2	2	**2**	1	3	**4**	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read			opinion		none			
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
undecided	1	0	1	2	2	1	1	0	2	0	0	0	0	5
agree	0	2	2	0	0	2	0	0	2	0	0	1	1	5
strongly agree	0	2	2	2	2	1	0	0	1	1	1	0	0	6
Total	1	4	**5**	4	**4**	4	1	1	**6**	1	**1**	1	**1**	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.79	1.00			
Oil	0.83	0.44	1.00		
Coastal	0.77	0.88	0.66	1.00	
General	0.89	0.92	0.65	0.93	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	2		
disagree	1	0	1	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3		
undecided	1	0	0	1	0	1	0	1	0	0	0	0	1	1	3	0	2	5	8		
agree	3	1	1	5	0	0	0	0	1	0	1	2	0	0	2	1	1	4	11		
strongly agree	1	0	0	1	0	0	0	0	1	1	0	2	0	0	0	1	0	1	4		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																													
FAMILIAR	attended						visited						read					opinion		none										
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total				
strongly disagree	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	2				
disagree	2	0	3	0	1	6	0	0	2	0	0	2	0	0	1	1	1	3	0	0	0	0	0	2	2	13				
undecided	5	1	5	0	0	11	0	1	3	1	0	5	0	0	0	2	0	2	0	0	0	0	1	0	2	3	21			
agree	4	1	1	1	7	14	0	0	3	2	0	5	4	2	3	6	1	16	2	2	0	3	4	1	3	11	48			
strongly agree	3	0	2	0	1	6	1	1	4	1	1	8	0	0	1	0	0	1	0	0	1	0	2	0	0	3	18			
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102			

Consistently 50% of those respondents from the general merchant sector of the industry who had attended a course at, or visited a ship handling simulator were either in disagreement or undecided with each of the cross tabulated questions. This would indicate a doubt in ship handling simulators capability for such training or a doubt in the appropriateness of training in these areas using a ship handling simulator. The correlation values between groups for each question were consistently high giving support to the overall conclusion that there may be a lack of knowledge in ice navigation by all groups.

10. Section I-Specialized Tasks.

The questions presented in section I sought responses to seven very distinct and separate areas of operation that were excluded from the previous sections of the questionnaire. To offer an opinion to these questions those surveyed would require some knowledge of each area as well as an understanding of simulation. As a consequence to the previous observation, several questions recorded a high number of undecided responses. Total responses to section I are summarized in table 5.32.

In reviewing the training practices of other countries it was of interest to note the increased support for examination of deck officers using ship handling simulators as well as utilizing simulators for refresher courses.

Questions #6 and #7 of section I addressed those areas of training and received a high level of agreement in both cases.

The appropriateness of training of crews for Fisheries Patrol vessels and cable laying vessels was asked in questions #3 and #4 respectively.

TABLE 5.32
SUMMARY OF RESPONSES TO SECTION I. SPECIALIZED TASKS

	SD	D	U	A	SA	mean	med	st.dev.
1.Pilotage licensing	13	25	23	79	61	3.74	4	1.20
2.Awarding of Sea Service	55	50	43	32	21	2.57	2	1.32
3.Fisheries patrol training	5	19	66	80	31	3.56	4	0.95
4.Cable laying training	4	16	77	76	28	3.53	4	0.90
5.Vessel traffic control	12	15	35	85	54	3.76	4	1.11
6.Examining of Masters and Mates	7	6	16	95	77	4.13	4	0.93
7.Inservice training (refresher)	2	6	16	83	94	4.29	4	0.81

Due largely to the very specific nature of these vessels, returns showed a high number of undecided responses. In both of the previous mentioned questions there was an overall agreement of opinion in the appropriateness for simulator training.

The remaining three questions in this section, #1, #2, and #5 recorded a high standard deviation value and were further analysed by cross tabulation in tables 5.33, 5.34, and 5.35. Question #1 was related to the training of marine pilots and appropriate licensing using a ship handling simulator. There was an overall agreement and a high correlation between all groups. Of the total responses, 140 (70%) agreed and of this group 76 (54%) had attended a course or visited a ship handling simulator.

Question #2 asked how appropriate it would be to award sea service

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	1	0	1	2	0	0	0	1	0	1	1	1	0	0	0	4
disagree	2	0	0	2	0	0	0	0	0	0	1	1	1	0	1	4
undecided	3	0	0	3	0	0	0	1	0	1	0	0	1	0	1	5
agree	4	0	2	6	2	1	3	2	0	2	0	0	0	1	1	12
strongly agree	5	1	0	6	1	0	1	2	1	3	0	0	2	0	2	12
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING															
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	2
disagree	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
undecided	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
agree	1	0	0	1	2	1	1	0	0	0	2	2	0	1	1	6
strongly agree	0	1	1	0	2	0	0	1	1	2	0	0	1	1	2	6
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read			opinion		none			
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
disagree	0	1	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	0	0	0	1	1	0	2	0	0	0	0	2
agree	1	1	2	3	3	3	0	0	3	0	0	0	0	8
strongly agree	0	2	2	1	1	0	0	1	1	1	1	1	1	6
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.96	1.00			
Oil	0.97	0.91	1.00		
Coastal	0.89	0.88	0.95	1.00	
General	0.94	0.91	0.99	0.98	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
disagree	2	0	1	3	0	0	0	0	1	0	0	1	0	0	1	0	0	1	5	
undecided	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	1	3	
agree	1	1	0	2	0	1	0	1	1	1	0	2	1	1	3	1	1	5	11	
strongly agree	1	0	1	2	1	0	1	2	1	0	0	1	0	0	1	0	2	3	8	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																											
FAMILIAR	attended						visited						read					opinion		none								
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total	
strongly disagree	2	1	1	0	0	4	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	0	6	
disagree	0	0	0	0	1	1	0	1	3	0	0	4	0	0	0	1	1	2	0	0	0	2	1	0	3	6	13	
undecided	3	0	3	0	2	8	0	0	0	1	0	1	0	1	0	1	0	2	0	0	0	0	1	0	0	1	12	
agree	6	0	4	0	3	13	0	0	5	2	0	7	3	1	1	6	1	12	1	1	0	1	3	1	4	9	42	
strongly agree	3	1	3	1	3	11	1	1	4	2	1	9	0	0	3	2	0	5	1	1	1	0	2	0	0	3	29	
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102	

Table 5.33.
Question 1.1
Pilotage licensing.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

Table 5.34.
Question I.2
Awarding of sea service.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	GREAT LAKE SHIPPING															
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	5	0	1	6	1	0	1	4	0	4	2	2	0	0	0	13
disagree	3	0	2	5	2	0	2	2	1	3	0	0	2	0	2	12
undecided	5	0	0	5	0	0	0	0	0	0	0	0	0	1	1	6
agree	2	1	0	3	0	1	1	0	0	0	0	0	0	0	0	4
strongly agree	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

REPRESENT	FISHING														
FAMILIAR	attended					visited		read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	2	0	0	0	2	0	0	0	1	1	1	1	0	1	1	5
disagree	1	1	0	0	2	1	1	0	0	0	0	0	0	2	2	5
undecided	0	0	0	0	0	0	0	1	0	1	1	1	1	0	1	3
agree	2	0	1	1	4	0	0	0	0	0	0	0	0	0	0	4
strongly agree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION												
FAMILIAR	attended			visited		read			opinion		none		
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	1	1	0	0	0	0	1	1	0	0	0	0	2
disagree	0	0	0	1	1	1	0	0	1	0	0	0	0	2
undecided	0	1	1	2	2	3	1	0	4	1	1	1	1	9
agree	1	1	2	1	1	0	0	0	0	0	0	0	0	3
strongly agree	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.82	1.00			
Oil	-0.12	0.05	1.00		
Coastal	0.52	0.42	-0.5	1.00	
General	0.91	0.75	0.09	0.11	1.00

REPRESENT	COASTAL SHIPPING																			
FAMILIAR	attended				visited				read				opinion		none					
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total	
strongly disagree	1	0	1	2	1	0	0	1	1	0	0	1	0	0	0	1	0	1	5	
disagree	2	1	1	4	0	1	0	1	0	0	1	1	0	0	1	0	2	3	9	
undecided	1	0	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	2	4	
agree	1	0	0	1	0	0	0	0	0	0	0	0	1	1	2	0	1	3	5	
strongly agree	1	0	0	1	0	0	1	1	2	0	0	2	0	0	1	0	0	1	5	
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28	

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended					visited						read					opinion		none						
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	2	2	1	0	3	8	0	0	3	2	0	5	2	1	2	4	0	9	1	1	0	1	2	0	4	7	30
disagree	4	0	2	0	1	7	0	1	4	1	0	6	1	0	0	3	1	5	0	0	0	2	1	1	0	4	22
undecided	4	0	4	0	2	10	0	0	0	2	0	2	0	1	1	1	1	4	1	1	1	0	2	0	1	4	21
agree	1	0	2	1	1	5	0	0	2	0	1	3	1	0	2	2	0	5	0	0	0	0	2	0	1	3	16
strongly agree	3	0	2	0	2	7	1	1	3	0	0	5	0	0	0	0	0	0	0	0	0	0	0	1	1	1	13
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

REPRESENT	GREAT LAKE SHIPPING																
FAMILIAR	attended				visited			read			opinion		none				
response	seagoing	education	govern'	total	seagoing	govern'	total	seagoing	student	total	seagoing	total	seagoing	manage'	total	Grand total
strongly disagree	2	0	0	2	0	0	0	2	0	2	0	0	0	0	0	4
disagree	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
undecided	4	0	0	4	1	0	1	3	0	3	2	2	1	0	1	11
agree	4	1	3	8	1	0	1	1	0	1	0	0	0	1	1	11
strongly agree	5	0	0	5	1	1	2	0	1	1	0	0	2	0	2	10
Total	15	1	3	19	3	1	4	6	1	7	2	2	4	1	5	37

Table 5.35.
Question 1.5
Vessel traffic control.

Total survey responses grouped into sectors of the industry they represent. Each table shows group responses against familiarity of ship handling simulators and role within industry.

REPRESENT	FISHING														
FAMILIAR	attended				visited			read			opinion		none			
response	seagoing	education	student	govern'	total	education	total	seagoing	manage'	total	seagoing	total	seagoing	education	total	Grand total
stongly disagree	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
disagree	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
undecided	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	2
agree	4	0	1	1	6	0	0	0	0	0	1	1	0	2	2	9
strongly agree	0	1	0	0	1	1	1	1	0	1	0	0	1	0	1	4
Total	5	1	1	1	8	1	1	1	1	2	2	2	1	3	4	17

REPRESENT	OIL EXPLORATION													
FAMILIAR	attended			visited		read			opinion		none			
reponse	seagoing	education	total	education	total	seagoing	education	govern'	total	education	total	seagoing	total	Grand total
strongly disagree	0	0	0	0	0	0	0	1	1	0	0	0	0	1
disagree	0	0	0	0	0	0	0	0	0	0	0	0	0	0
undecided	1	0	1	0	0	0	0	0	0	0	0	0	0	1
agree	0	2	2	2	2	3	1	0	4	1	1	1	1	10
strongly agree	0	2	2	2	2	1	0	0	1	0	0	0	0	5
Total	1	4	5	4	4	4	1	1	6	1	1	1	1	17

Correlation factors
for group grand totals.

	Lakes	Fishing	Oil	Coastal	General
Lakes	1.00				
Fishing	0.65	1.00			
Oil	0.64	0.99	1.00		
Coastal	0.63	0.99	0.99	1.00	
General	0.76	0.94	0.91	0.94	1.00

REPRESENT	COASTAL SHIPPING																				
FAMILIAR	attended				visited				read				opinion		none						
response	seagoing	education	student	total	seagoing	manage'	education	total	seagoing	education	student	total	seagoing	total	seagoing	education	govern'	total	Grand total		
strongly disagree	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1		
disagree	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1		
undecided	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2		
agree	2	1	1	4	0	1	0	1	2	1	0	3	1	1	3	2	2	7	16		
strongly agree	4	0	1	5	0	0	1	1	0	0	1	1	0	0	0	0	1	1	8		
Total	6	1	2	9	1	1	1	3	3	1	1	5	1	1	5	2	3	10	28		

REPRESENT	GENERAL MERCHANT FLEET																								
FAMILIAR	attended						visited						read					opinion		none					
response	seagoing	manage'	education	student	govern'	total	seagoing	manage'	education	govern'	other	total	seagoing	manage'	education	govern'	other	total	govern'	total	seagoing	manage	education	student	govern'	total	Grand total
strongly disagree	1	0	1	0	1	3	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	5
disagree	0	1	2	0	0	3	0	0	2	2	0	4	0	0	0	2	0	2	0	0	0	0	0	0	3	3	12
undecided	4	1	2	0	1	8	0	0	0	1	0	1	0	0	1	4	0	5	2	2	1	0	2	0	0	3	19
agree	5	0	2	1	4	12	0	1	5	1	1	8	2	1	1	4	2	10	0	0	0	2	4	0	3	9	39
strongly agree	4	0	4	0	3	11	1	1	5	1	0	8	0	1	3	0	0	4	0	0	0	1	1	1	1	4	27
Total	14	2	11	1	9	37	1	2	12	5	1	21	4	2	5	10	2	23	2	2	1	3	7	1	7	19	102

to persons having attending a course on a ship handling simulator. The 201 overall responses showed 105 (52%) disagreed and 53 (26%) agreed, with 43 (21%) remaining undecided. As the related literature reflected, awarding of sea service in this manner was receiving attention ir other countries. The correlation values were varied and showed a large range of opinion exists between mariners on this question. Of the 101 mariners who had attended a course at such a facility 47 (47%) disagreed while 24 (24%) agreed.

The final question of section I to be cross tabulated was #5 relating to vessel traffic control. Responses to this question showed 139 (69%) agreed with the training and 12 (6%) strongly disagreed reflecting a broad range of opinion, however 74 (73%) of the 101 attending a course at or visiting a ship handling simulator agreed and of those 41 (41%) strongly agreed.

11. Written comments from mariners.

The comments written on the final section of the questionnaire were many and varied. In the following pages an attempt is made to provide a collection of the comments received. Reporting of the comments was restricted to those which were relevent to the questions on the survey. There were numerous comments excluded which referred to politics, the national economy and the operating conditions of the Canadian merchant service. All comments were reported as received and no specific order or categorizing is applied to the reporting of the comments.

> "Have attended ship handling and emergency ship handling course and feel a course and simulator is required in Canada. A valuable learning tool."

"Parts F and G undecided due to lack of knowledge in the area."

"I strongly agree with a simulator course in Canada. Have no experience in F and G therefore undecided."

"In my opinion this type of simulator is best suited for training in pilotage waters and manoeuvring of vessels at slow speeds under various conditions."

"Any training on a simulator that will allow an officer to practice things they do not encounter will be of great help. Emergency situations, ship handling in ice, wind and current."

"Sections F and G not answered no knowledge in these areas."(many similar responses)

"All simulator training no matter what type will provide the navigator with useful practical experience."

"Simulators of this caliber should not be used for such things as learning communication skills or bridge procedures. They should be used for familiarizing officers with unfamiliar vessel types and territories."

"Have two courses to date (however) there is a lot of training which can be done through other simulators at less cost. They should be geared towards ship handling at advanced levels."

"Simulator training is long overdue due to its ability to test special situations and conditions. Flight simulators can do it why not for ships."

"Pilotage licensing exam on a simulator with a practical on the section being examined."

"Simulator training offers an opportunity to learn without the risk of a costly mistake. At some point on the job training must occur."

"Some reduction of sea time is appropriate if students have completed a simulator course. Good for examination "

"Simulation does not replace sea service."

"If the aviation industry can do it so can we."

"Simulation endorsements for varying levels, ie fishing, towing(of other vessels)"

"Simulators are the way of the future and in my opinion oral examinations should be substituted by simulator checks."

"I believe certain types of training (mentioned) would be better handled by good videos than by simulators."

"In sections such as G and H I have disagreed as I am doubtful that the present technology can contribute in a meaningful way."

"Training should be ship handling under various conditions with different ship types using bridge procedures."

"In my nautical career the only thing I lack is experience in ship handling. If I had stayed deep-sea I would have obtained a master mariners certificate and not docked a ship. A ship handling simulator would be of great value."

"It should not be a substituted for practical training in emergencies, team work, navigation or specialized tasks."

"Have scored 3 (undecided) where I have no experience."

"Results in more competent and confident officers."

"Should be incorporated into present radar simulator training."

"An extremely useful training tool."

"Important to consider how the equipment would be best employed as opposed to what it could be used for."

"Simulator training can never replace 'live hands on 'experience obtained in the real world."

"Ship handling simulators should not be compulsory for sea going personnel."

"Simulator training may develop unwarranted confidence in one's ability to perform these tasks."

"Regardless of how advanced the simulator, some tasks can only be learnt from actual practical experience or training on a real vessel."

"I fully support the use of simulators. This is particularly so in coastal ferry operations. The intensity of operation is very high and the consequence of error can be extreme. Few opportunities for crew training and not available during operations."

"The pedagogical value of simulator training is well established. The simulator makes it possible for a large number of scenarios to be encountered in a relatively short period of time. Exposure to a representative cross section of operational situations is assured."

"Many tasks can be better trained on part task simulators. Licensing on the basis of simulator achievements can be very dangerous."

Three general statements can be abstracted from a review of the written comments. Firstly, there was a general consensus that a ship handling simulator is necessary for marine training in Canada. Secondly, that training on such a simulator should not replace nor eliminate the experience gained from hands on training and should not replace sea service. Lastly, the comments indicate that the training conducted on a ship handling simulator should be directed towards more advanced types training.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

This chapter presents a synopsis of the problem under investigation, reports the basic conclusions reached in the study, and offers some recommendations related to the topic.

1. Summary.

The purpose of the study was to identify the training elements which may be offered on a ship handling simulator to best meet the needs of the marine industry of Newfoundland and the rest of Canada. Through an offshore development funding agreement, a state of the art ship handling simulator facility has been established in St John's. Such a facility requires extensive funding to operate in addition to the initial capital investment required. The study was developed to obtain Canadian mariners opinions as to the appropriate training which should be offered utilizing such a facility.

The survey investigated eight areas of training in an attempt to answer the above question. These areas were ship handling, navigation, emergencies, team work, the fishing industry, the offshore petroleum industry, navigation in ice and other unrelated specialised tasks. To allow respondents the opportunity to include comments, a section was included at the end of the questionnaire. The questionnaire was distributed throughout Canada to mariners who held marine certification with a minimum requirement of attendance at a radar simulator course. Random sampling was not part of the

survey. The survey was distributed to all marine colleges, Canadian Coast Guard centres, a shipping company and numerous individuals whose names had been drawn from address lists etc. The total number of returns was 201 which represents a broad cross section of the marine industry. The study excluded research projects and military training from the survey.

Analysis of the data was restricted to descriptive statistics calculated from the five point responses to each question. Statistics for each question included the mean and median averages as well as the standard deviation. Cross tabulation of data using variables collected in the introductory section of the questionnaire was completed for all questions where the standard deviation exceeded 1.00. The questions specific to the offshore and fishing sectors were all cross tabulated against the total responses. This additional comparison resulted from the high number of undecided returns in these unique areas of the marine industry. In all cases of cross tabulation the correlation values between groups was calculated and reported.

2. Conclusions.

In this section, the responses to the five general research questions established in chapter two, are presented.

The first of those questions addressed training for ship handling, navigation, marine emergencies and bridge team work and asked how appropriate it was to conduct such training utilizing a ship handling simulator. These four training areas each provided a basis for a specific question group in the survey and will be reported on separately.

The twenty two questions in section B of the questionnaire addressed specific ship handling techniques as well as presenting various condition in which training may be required.

There was a high level of agreement in twenty of the questions. Two questions, dry-docking a vessel and ship handling in adverse weather conditions received less agreement. The opinions of the respondents indicate that an alternative forms of training in these two areas should be sought.

Navigation is an integral component of bridge work and ship handling which was reflected in the thirteen part questions included in section C. A majority of respondents agreed with this form of training for all thirteen questions. Of the thirteen questions, six returned a relative high number of responses indicating indecision or disagreement. In each case the type of navigation training was fundamental to deck officers and presently included in other forms of training. Consequently these areas of training such as radio communication and navigation in open water may be met by alternative training methods or by incorporating them into broader training exercises.

The section on marine emergencies addressed areas for hands on emergency training which is not presently offered during the certification of ships officers in Canada. All questions received an overall agreed to response, however the number of respondents who did not agree with the appropriateness of this form of training on a ship handling simulator gives rise to either a need for an alternative form of practical training or reflects a response to the unknown!

Three questions in the section dealing with team work, received a relatively high number of undecided or disagreed returns. The areas being

questioned were, training in interpersonal relationships, developing standing orders and working with unfamiliar crews. Although these areas received general agreement it may be more appropriate to incorporate this training into broader training scenarios.

The second research question sought to identify training on a ship handling simulator for the offshore petroleum sector of the industry. The questions in section F of the survey were based on input from those in the industry and received agreement in all cases. Very few disagreed with the appropriateness of this form of training however a high number of returns responded as undecided, indicating a lack of knowledge in this specialized sector by those in other sectors of the industry. The responses by the seventeen mariners from the offshore sector of the industry included in the survey agreed with the identified training.

The third research question dealt with the fishing sector of the industry. The questions for this section, section G, resulted from input by active fishermen and reflected some of the activities of a fishing vessel at sea. The survey sought to identify how appropriate training in these activities would be on a ship handling simulator. The responses to the questions in this section reflected an overall lack of knowledge of the fishing sector by those mariners from other areas of the industry. All questions received a very high number of undecided responses with relatively few returns indicating disagree. Although the fishermen who responded to the survey did not unanimously agree with all of the questions, they did return a majority in agreement in most questions. The exception was the question referring to fish detecting and hunting were they returned a high undecided response.

Question four sought opinion in the area of navigation in ice and its appropriateness in training on a ship handling simulator. Navigation in ice is an extremely specialized skill with no practical training offered in the normal process of officer certification. The simulator facility in St John's did not have the full ice presentation capability at the time of the survey and respondents were asked to comment assuming the simulation capability existed. All questions were generally agreed too however as with the previous two sections, a high undecided response was recorded. The written comments on several returns support the conclusion that several of the undecided and disagreed responses reflected doubt as to the capability of a simulation reflecting true ice conditions.

The final question sought opinions on specialised task training. The questions in section I of the questionnaire resulted from associated reading and informal discussions with mariners. Some of the questions such as in service training and examination using a ship handling simulator received strong agreement. The question of awarding sea service for time associated with training on a simulator was strongly rejected. The question of pilot licensing was supported however several written comments and disagreed responses indicate this is an area which requires further research.

3. Recommendations.

The results of the survey indicated agreement that training on a ship handling simulator was strongly supported by Canadian mariners across all sectors of the industry. The appropriateness of specific training on a ship

handling simulator as identified in the questionnaire was generally supported with the exception of the awarding of sea service.

The economic requirements to operate a ship handling simulator in addition to making the appropriate training available to Canadian mariners from across the country where beyond the scope of this study. The responsibility remains with all mariners, marine managers, shipping interests and governments to ensure appropriate training is offered for the Canadian marine industry.

The findings of this study suggest a number of recommendations with regard to training on Canada's ship handling simulator.

Recommendation 1. There should be advanced training courses in ship handling .

Recommendation 2. There should be advanced training courses in navigation.

Recommendation 3. Basic navigation and radio communications be an integral component of all training.

Recommendation 4. A ship handling simulator be used for training in marine emergencies.

Recommendation 5. A team work concepts be integrated into training programs.

Recommendation 6. There should be advanced training for the offshore petroleum sector of the industry.

Recommendation 7. There should be advanced training for the fishing sector of the industry

Recommendation 8. There should be training courses in navigation in ice for mariners at all levels

Recommendation 9. Refresher (in-service) training be offered for all mariners.

Recommendation 10. Examinations for Masters and Mates navigation certification be conducted on a ship handling simulator on a trial basis.

Recommendation 11. The time accumulated whilst attending training on a ship handling simulator should not be awarded as qualifying sea service towards future certification requirements.

Recommendation 12. There should be advanced training courses for marine pilots as partial fulfillment of marine pilot certification.

Recommendation 13. There should be training courses for the operators of specialized marine vessel.

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APPENDIX 1
QUESTIONNAIRE

QUESTIONNAIRE GUIDE

Ship Handling Simulator.

A Brief Introduction.

Ship handling simulators are a natural progression from the traditional radar simulators which are located at many nautical institutes throughout the world. A ship handling simulator is designed to provide an environment suitable for the education and training of personnel in various marine operations. The simulator includes an own ship bridge equipped with realistic navigation receivers and instruments making it possible for a trainee to perform realistic manoeuvres. All responses to such manoeuvres are presented on the instruments and the visual screens, visible at any given moment when looking out of the bridge windows. For the visualization of navigational or other types of lights and scenes, day and night systems are provided. The visual data comprises information such as ownships bow and deck, the horizon, other ships and their navigational lights, lighthouses, buoys, as well as coast lines and harbours. Own ship can be operated in the same way as the movements of a real ship. The different signals presented by ship borne equipment, the charted position and the vessel's course and speed will determine the information displayed on the instruments and observed on the visual system.

The ship handling simulator is a very advanced computerized system, based on accurate data representing ship's characteristics. The system to be operated by the Marine Institute is designed to provide a 240 degree field of

vision and is mounted on a motion platform simulating the dynamic motion of a vessel.

The principle of simulation however, remains the same for both ship handling simulators and radar simulators. Neither are designed as a substitute for training aboard a vessel but both are designed to enhance the safety and training of mariners.

For the purpose of this study I would request that you assume the facility is able to offer the training stated. **The questions are attempting to identify "how appropriate is the training? "** <u>not</u> **" how capable is the simulator?"**

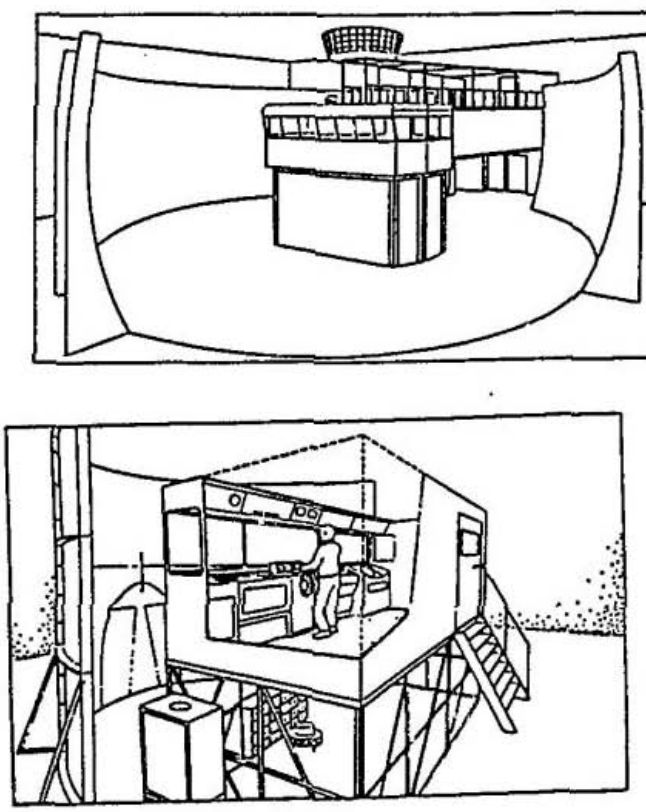

Figure 1 A typical ship handling facility

A. GENERAL QUESTIONS

1. Which one of the following do you most represent?
_____Great Lake shipping
_____Fishing industry
_____Oil exploration and support vessels
_____Coastal vessel operator
_____General merchant fleet (including government vessels)

2. In which role are you currently engaged?
_____Sea Going
_____Management
_____Education
_____Student
_____Government
_____Other (please state) _____

3. How familiar are you with ship handling simulators?
_____Attended a course
_____Visited a facility
_____Read related literature
_____Based on other's opinions
_____None
_____Others (please state) _____

4. Have you attended a radar simulator course within the last ten years? (10)
_____Yes
_____No

5. Were your Marine qualifications obtained in Canada?
_____Yes
_____No
_____None
Please state qualification
_____

THE FOLLOWING QUESTIONS ARE INTENDED TO **IDENTIFY THE TRAINING REQUIREMENTS** FOR CANADIAN MARINERS THAT A SHIP HANDLING SIMULATOR MAY **APPROPRIATELY OFFER**. IT IS TO BE **ASSUMED THAT THE SIMULATOR IS CAPABLE** OF OFFERING THE VARIOUS TYPES OF TRAINING AND THAT THE TRAINING WOULD BE PREPARATORY FOR, AND SUPPLEMENTARY TO, "SEA GOING" EXPERIENCE.

Please circle the selected number.
SD indicates strongly disagree
D indicates disagree
U indicates undecided
A indicates agree
SA indicates strongly agree

B. SHIP HANDLING

In your opinion a ship handling simulator would be appropriate for training in:	SD	D	U	A	SA
1. Handling a vessel in a river or estuary having regard to the effects of current, wind and restricted water on the response to the helm.	---- 1	2	3	4	5
2. Manoeuvring in shallow water and confined areas.	---- 1	2	3	4	5
3. The interaction between passing vessels and between own ship and nearby banks.	---- 1	2	3	4	5
4. Berthing and unberthing in various conditions of weather.	---- 1	2	3	4	5
5. Berthing and unberthing with and without the assistance of tugs.	---- 1	2	3	4	5

	SD	D	U	A	SA
6. Anchoring in various conditions using different moors.	---- 1	2	3	4	5
7. Handling and managing a vessel at sea in adverse weather conditions.	---- 1	2	3	4	5
8. Approaching pilotage stations with due regard to traffic and weather conditions.	---- 1	2	3	4	5
9. Manoeuvring in traffic separations scheme.	---- 1	2	3	4	5
10. Dry docking a vessel.	---- 1	2	3	4	5
11. Ship handling and manoeuvring of:					
(a) various vessel types	---- 1	2	3	4	5
(b) various loaded conditions	---- 1	2	3	4	5
(c) various engine/bowthruster configuration	---- 1	2	3	4	5
(d) unfamiliar circumstances	---- 1	2	3	4	5
(e) familiar circumstances	---- 1	2	3	4	5
12. Collision avoidance manoeuvring.	---- 1	2	3	4	5
13. Vessel manoeuvring characteristics. (advance, transfer)	---- 1	2	3	4	5
14. Using navigational bridge equipment.	---- 1	2	3	4	5
15. Multiship collision avoidance.	---- 1	2	3	4	5

	SD	D	U	A	SA
16. Manoeuvring					
(a) by day	---- 1	2	3	4	5
(b) by night	---- 1	2	3	4	5
(c) in restricted visibility.	---- 1	2	3	4	5

C. Navigation

In your opinion a ship handling simulator would be appropriate for training:	SD	D	U	A	SA
1. Navigation on coastal passages.	---- 1	2	3	4	5
2. Navigation in confined waters.	---- 1	2	3	4	5
3. Navigation in open sea.	---- 1	2	3	4	5
4. Passage preparation and execution.	---- 1	2	3	4	5
5. Pilotage support procedures.	---- 1	2	3	4	5
6. Watchkeeping practices and procedures	---- 1	2	3	4	5
7. Radio communication (V.H.F., S.S.B.).	---- 1	2	3	4	5
8. Collision avoidance.	---- 1	2	3	4	5
9. Recognition of navigational lights and shapes.	---- 1	2	3	4	5
10. Navigation position fixing using:					
(a) visual bearings	---- 1	2	3	4	5
(b) radar range and bearings	---- 1	2	3	4	5

	SD	D	U	A	SA
(c) electronic systems	---- 1	2	3	4	5
11. Automatic Radar Plotting Aids (A.R.P.A.) systems.	---- 1	2	3	4	5

D. Emergency

In your opinion a ship handling simulator would be appropriate for training:	SD	D	U	A	SA
1. Man overboard procedure under various conditions.	---- 1	2	3	4	5
2. Search and Rescue patterns:					
(a) single ship	---- 1	2	3	4	5
(b) multi ship	---- 1	2	3	4	5
(c) ship/aircraft	---- 1	2	3	4	5
3. Co-ordination of a Search and Rescue.	---- 1	2	3	4	5
4. Engine/bridge equipment failure procedures when in:					
(a) open sea	---- 1	2	3	4	5
(b) restricted waters	---- 1	2	3	4	5
5. Vessel towing procedures.	---- 1	2	3	4	5
6. Stranding and beaching operations.	---- 1	2	3	4	5
7. Collision incidents.	---- 1	2	3	4	5

E. Bridge team work

In your opinion a ship handling simulator would be appropriate for:	SD	D	U	A	SA
1. Developing interpersonal relationships.	---- 1	2	3	4	5
2. Command training:					
(a) in routine circumstances	---- 1	2	3	4	5
(b) in emergency circumstances	---- 1	2	3	4	5
(c) in unfamiliar circumstances	---- 1	2	3	4	5
3. Routine bridge procedures training.	---- 1	2	3	4	5
4. Developing of 'Standing Orders'.	---- 1	2	3	4	5
5. Working with unfamiliar crews.	---- 1	2	3	4	5
6. Developing pilotage procedures.	---- 1	2	3	4	5

F. Offshore Petroleum Industry

In your opinion a ship handling simulator would be appropriate for training:	SD	D	U	A	SA
1. Holding station by a standby vessel.	---- 1	2	3	4	5
2. On location operations for a standby vessel.	---- 1	2	3	4	5
3. Manoeuvring close to rigs by a standby vessel.	---- 1	2	3	4	5
4. Rig/Drill platform evacuation by a standby vessel.	---- 1	2	3	4	5
5. Drillship/support vessel interaction.	---- 1	2	3	4	5

	SD	D	U	A	SA
6. Anchor handling by a standby vessel.	---- 1	2	3	4	5
7. Towing of drilling rigs.	---- 1	2	3	4	5
8. Watchkeeping aboard drillships/platforms.	---- 1	2	3	4	5
9. Dynamic positioning systems and operations.	---- 1	2	3	4	5
10. Engine thruster and multi functional control systems operations.	---- 1	2	3	4	5

G. Fishing

In your opinion a ship handling simulator would be appropriate for training:	SD	D	U	A	SA
1. Ship handling skills when:					
(a) shooting fishing gear	---- 1	2	3	4	5
(b) hauling fishing gear	---- 1	2	3	4	5
(c) towing fishing gear	---- 1	2	3	4	5
(d) towing fishing gear in a collision situation	---- 1	2	3	4	5
(e) operating in ice while towing fishing gear.	---- 1	2	3	4	5
2. Ship handling on various types of vessels:					
(a) small fishing vessels	--- 1	2	3	4	5
(b) stern trawlers	---- 1	2	3	4	5
(c) purse seiners.	-----1	2	3	4	5
3. Fish detection and hunting.	---- 1	2	3	4	5

	SD	D	U	A	SA
4. Integrated electronic equipment systems operation and use.	---- 1	2	3	4	5
5. Fishing team procedures.	---- 1	2	3	4	5
6. Coming alongside another vessel.	---- 1	2	3	4	5
7. Operating/manoeuvring when 'iced up'.	---- 1	2	3	4	5

H. Navigation in Ice

In your opinion a ship handling simulator would be appropriate for training in:	SD	D	U	A	SA
1. Detection and identification of various ice forms.	---- 1	2	3	4	5
2. Passage planning and execution of passsage in ice.	---- 1	2	3	4	5
3. Sighting and reporting ice.	---- 1	2	3	4	5
4. Navigation in ice by:					
(a) day	---- 1	2	3	4	5
(b) night	---- 1	2	3	4	5
(c) restricted/weather conditions.	---- 1	2	3	4	5
5. Shiphandling in various ice conditions.	---- 1	2	3	4	5
6. Ice breaking and associated tasks (path making/following).	---- 1	2	3	4	5
7. Collision avoidance in ice.	---- 1	2	3	4	5

	SD	D	U	A	SA
8. Anchorage/berthing in ice.	---- 1	2	3	4	5
9. Confined navigation in ice.	---- 1	2	3	4	5

I. Specialized Tasks

In your opinion a ship handling simulator is appropriate for:	SD	D	U	A	SA
1. Pilotage licensing.	---- 1	2	3	4	5
2. Awarding of Sea Service.	---- 1	2	3	4	5
3. Fisheries patrol training.	---- 1	2	3	4	5
4. Cable laying training.	---- 1	2	3	4	5
5. Vessel traffic control.	---- 1	2	3	4	5
6. Examining of Masters and Mates.	---- 1	2	3	4	5
7. Inservice training (refresher).	---- 1	2	3	4	5

Comments:

APPENDIX 2

An Abstract from:

Newfoundland Institute of Fisheries
and Marine Technology
Department of Nautical Science
Ship Handling Simulators
A Discussion Paper
January 1985

5. Aims, Goals and Objectives

The objectives of a program of navigation and ship handling training and research on a simulator must address both the Nautical Science Department and Marine Institute objectives and goals, since by so doing they will fulfill the mandate of the Institute to be of service to the Marine Industry.

5.1 Aims and Goals of the Marine Institute

Aim:

The Aim is that the Marine Institute shall be a centre of excellence for education, training, applied research, and service in all aspects of fisheries, navigation, marine sciences and engineering technology.

Goals:

To provide quality education and training designed to enable students to better themselves and contribute to the improvement of marine and related industries through increased knowledge and skills, technical and vocational excellence, and personal growth and development.

To provide for interactive service and transfer of technology to meet individual, government and industrial needs.

To provide an effective extension and continuing education capability to meet the needs of individuals and industry.

To foster an environment which encourages applied research and development.

To provide leadership in policy and technical development in marine and related industries.

5.2 Objectives of the Nautical Science Department and the Objectives of Simulator Training & Research

Objective 1

Department To provide an education in Nautical Science that will be of value for today and the future, recognizing technological trends and changes and preparing the student accordingly with programs of sufficient flexibility

and diversity to meet these changes as well as the individual needs of the student.

Simulator To improve the existing standard of watch keeping, bridge procedures and ship maneuvering by controlled effective training leading to judgment improvement through decision making practice, ensuring all members of a bridge watch perform their duties efficiently and that Masters and Mates appreciate the risks to which they are exposed.

Objective 2

Department To ensure students are provided with facilities, expertise and encouragement whereby they are prepared to take their place in the marine and fishing industry.

Simulator To provide a facility appropriate for the needs of both basic, intermediate and advanced students.

Objective 3

Department To provide appropriate training for the marine and fishing industry throughout the Province in cooperation with Extension Services.

Simulator To ensure the benefits of a simulator facility are appreciated throughout the Nation by all sectors of the marine industry so they may avail themselves of the training and research capabilities and opportunities.

Objective 4

Department To be a source of advice and assistance to the marine and fishing industries and to take part together or separately in applied research and development programs as well as seminars and workshops.

Simulator To encourage applied research both to further the aims of the Institute and to recover costs of the facility. To foster an environment that

leads to the facility becoming a natural centre for relevant seminars and workshops.

Objective 5

Department To develop and maintain close liaison with industry, other training institutions and related agencies. To develop the Department's credibility to the extent it will always be involved in development, modification and evaluation of education and training programs.

Simulator To form an in-house Management Group with representation from industry, government and related agencies to ensure program development has the widest acceptance. To encourage cooperation between sister training organizations and applied research facilities.

6 Limitation of present college bridge simulator.(omitted)

7 Ship handling simulator objectives

7.1 Philosophy (omitted)

7.2 Training

7.2.1 General

The main objectives of a Ship Handling Simulator course are to ensure the officers attending can formulate and exercise a detailed passage plan, optionally using all the resources available on the bridge. They must also be aware of the value and form of specified bridge procedures and be able to interpret a ship's maneuvering data in an intelligent manner as well as respond efficiently to emergencies. Experience shows that students are initially surprised at the realism of the bridge and the visual scene and this quickly overcomes any skepticism about the value of a simulator.

7.2.2 Specific Objectives

Depending on the level of training, to ensure those that complete the course,

1. Understand their respective duties and duties of others on a Bridge Watch keeping Team.
2. Have a degree of steering skill that will enable them within a short period to effectively apply those skills in reality.
3. Are psychologically prepared, particularly the new entrant, for the shipboard situation through a heightened awareness of purpose.
4. Understand the importance of a proper lookout and correct reporting procedures.
5. Are aware of the value and form of correct bridge procedures.
6. Understand the principle, use and limitations of the individual items of bridge equipment.
7. Know how to respond effectively to hazardous and emergency situations, and to assess the effect of an emergency on the navigational regime.
8. Understand a vessel's handling characteristics and interpret maneuvering data.
9. Are aware of the need to properly use resources of manpower and equipment.
10. Are able to formulate and execute a detailed passage plan on the chart and on a passage planning document.
11. Are aware of the communication procedures on board and between other ships and the shore using IMO English language.

8. Uses of a Ship Simulator

8.1 Training of Ships' Officers

1. Navigation: structured training from new entrant seaman or cadet to master's certificate level with any required level of navigational complexity introduced into the exercise.

2. Rule of the road: structured training as above.
3. Ship familiarization: demonstration of the manoeuvring/handling characteristics of the vessel being simulated.
4. Port familiarization: simulation of a specific port to provide basic port familiarization for pilots and/or masters using the port. For example training of Seaway masters, or the crews of the new CN Ferries scheduled for Port Aux Basques.
5. Team-work and procedural training: demonstration of the value of teamwork in conducting the navigation; the importance of cross-checking individual actions and decisions; the value of an efficient bridge organization based on specified bridge procedures. The team may be augmented by personnel from other disciplines, for example surveyors, for a particular exercise. In this manner the entire Deck or Bridge crew of a ship, from pre-sea new entry to practicing shipmaster and pilot can be trained at an appropriate level. The list of seagoing personnel would include:

    Pre Sea Students (Seaman)
    Navigational Ratings
    Able Seaman
    Cadet/Diploma Students
    Watch keeping Mates (SEN I)
    Mates and Masters (SEN II)
    Refresher Courses for:
    Ship Masters
    Ship Mates
    Pilots
    MED III Students
    Ice/Weather Observers
    Fishery Observers
    Fishermen (Class IV, III, II, I)
    Fishing Certificate Upgrades

An example of a Bridge Team Training Crew is as follows,

(a) Three students (seaman or pre-sea) to act as visual lookouts and the hand steering of the ship simulator.
(b) A ship master.
(c) An officer of the watch.
(d) An assistant officer of the watch.
(e) Four additional personnel to observe the performance of the practicing bridge team, either directly or by monitor.
(f) Pre-operation practice in moving large structures from building area to site - i.e. as in the deployment of "Stratfjord B" in the North Sea. Pre-operations training, for example in towing a structure from a harbour and positioning on the seabed.

6. Emergency training: demonstration of the value of contingency planning and evaluation of alternative responses to emergency situations. Improving judgment by providing experience in handling high risk situations. Courses designed to decrease the risk of operational casualties and thereby reduce lost time repair and insurance costs to ship operators and managers. The decision makers judgment is strengthened by forcing him into situations that are just beyond his level of experience. This training is particularly relevant to the MED III Program which studies the objectives, preparation and implementation of contingency plans and emergency operation. For example training in MODU support, particularly with the configuration proposed in Section 9.

7. Pre-command training: demonstration of the value of, and techniques required, for efficient management of the navigation; structures programme of ship manoeuvring.

8. Recurrent training: review and update of previous training; this is trades where the opportunity to gain on-board experience in navigation and ship manoeuvring is very limited.

Training may also be appropriate in many other areas, such as surveyors and ice observers

8.2 Ice Operations

8.2.1 General

The training requirement is clear when the level of skill necessary to operate an ice-breaker within design limits is considered, both in open ice and when working close to another vessel. The operational research possibilities are also apparent. However although the following section outlines requirements for ice capability it must be remembered that no such equipment is presently in existence, and although apparently technically possible to develop will probably be very expensive, both in terms of data capability, visuals and vessel motion requirements. In fact the visual presentation may be more practical with the introduction of the visual interactive video disk, whereby a film of the environment can be accessed by the computer for screen presentation.

APPENDIX 3

Distribution list
Canadian Marine Colleges
and
Canadian Coast Guard

Distribution list

Canadian Marine Colleges.

Fisheries and Marine Institute of Memorial University of Newfoundland
P.O.B. 4920
St John's Nfld

Nova Scotia Nautical Institute
P.O.B. 1225
Port Hawkesbury Nova Scotia

Nova Scotia School of
Fisheries
P.O.B. 700
Pictou Nova Scotia

Canadian Coast Guard College
P.O.B. 4500
Sydney Nova Scotia

Northwest Community College
130 First Ave. West
Prince Rupert B.C.

Georgian College of Applied Arts and Technology.
8th. Street East
P.O.B. 700
Owen Sound Ontario

Pacific Marine Training Institute
265 W. Esplanade
N.Vancouver B.C.

Camosum College
3100 Foul Bay
Victoria B.C.

School of Fisheries
Dept. of Fisheries
P.O.B. 178
Caraquet New Brunswick

Holland College Marine Centre
100 Water Street
Summerside P.E.I.

Institut Maritime du Quebec
53 St. Germain Ouest
Rimouski Quebec

Institut Maritime du Quebec
C.P. 2156
St. Romuald Levis Quebec

Distribution list

Canadian Coast Guard Centres

Ships Safety Branch
344 Slater St.
11th Floor Ottawa

Ships Safety Branch
344 Slater St.
9th Floor Ottawa

Ships Safety Branch
34 Harvey Rd. P.O.B. 1300
St John's

Ships Safety Branch
South side Rd.
St John's

Ships Safety Branch
208 Federal Building
Marystown Nfld.

Ships Safety Branch
122 Main St
Lewisport Nfld.

Ships Safety Branch
Regional Office
46 Portland St.
Dartmouth. Nova Scotia

Ships Safety Branch
P.O.B. 1013
Dartmouth Nova Scotia

Ships Safety Branch
P.O.B. 7730 stn. A
Saint John New Brunswick

Ships Safety Branch
P.O.B. 1270
Charlotte town P.E.I.

Ships Safety Branch
196 George St.
Port Hawkesbury

Ship Safety Branch
P.O.B. 850
Yarmouth

Ships Safety Branch
101 Boulevard Champain
Quebec

Ships Safety Branch
781 Rue William's St
Montreal Quebec

Ships Safety Branch
70 St. Germain Est.
Rimouski Quebec

Ships Safety Branch
201 North Front Street
Sarnia Ontario

Ships Safety Branch
56 Aberfoyle Crescent
Toronto

Ships Safety Branch
43 Church St.
St Catherine's Ontario

Ships Safety Branch
800 Burrard St.
Vancouver

Ships Safety Branch
101-260 W. Esplanade
N. Vancouver

Ships Safety Branch
P.O.B. 3670
Prince Rupert B.C.

Ships Safety Branch
60 Front St.
Nanaimo B.C.

Ships Safety Branch
106 Clarence St.
Kingston

Ships Safety Branch
44 Huronario St.
Collingwood
Ontario

Ships Safety Branch
302-549 Columbia St.
New Westminister

Ships Safety Branch
409-1200 Park Royal
W. Vancouver

Ships Safety Branch
25 Huran St.
Victoria B.C.

APPENDIX 4

Correspondence

6250 Summit Ave
West Vancouver
Vancouver.
B.C.
V7W 1Y2

Arril 29th 1993.

Dear Sir/Madam,

As a graduate student at Memorial University of Newfoundland, I am writing a thesis towards a Masters degree in Education Administration. I will be most appreciative if will you give a few moments of your time and expertise to complete the attached questionnaire.

The aim of the survey is to identify the training needs for Canada's Ship Handling Simulator(s). The questionnaires are numbered for purposes of compiling the data but will be treated in the strictest of confidence. If you feel confidentiality is unnecessary please complete the NAME section of the questionnaire which will allow for a follow up on the survey if necessary (please include a telephone/fax # and or address),

In anticipation I offer my thanks and remain,

Yours faithfully,

RODNEY G. HESP
Master Mariner

MEMORANDUM

ULS CORPORATION

TO : All Masters and Deck Officers

FROM: John Greenway

DATE: August 19, 1993

RE : Survey on Simulators / Training

We have been asked to participate in responding to a questionnaire/study on ship handling simulators and training needs in Canada.

At your convenience, could you complete the enclosed questionnaire which is being circulated to our fleet, and return the completed forms to my attention for return to Capt. Rodney Hesp as a ULS fleet response.

Please return your responses by August 31, 1993.

Thank you for your co-operation.

Capt. John Greenway
Fleet Supt.-Operations

Attach.