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Distance learning methods and technologies : benefits to the maritime industry and developing countries

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DISTANCE LEARNING METHODS AND TECHNOLOGIES

Benefits to the Maritime Industry and Developing Countries.

By

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Republic of Trinidad and Tobago

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

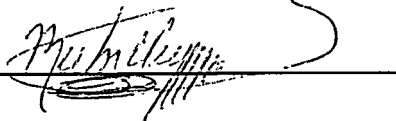## MASTER OF SCIENCE

in

MARITIME EDUCATION AND TRAINING

(Nautical)

1998

DECLARATION

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

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

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DEDICATION

This dissertation is dedicated to my mother, Carmen Huggins, and to the memory of my deceased father, Alston Huggins, who would have shared in my success.

ABSTRACT

Title of Dissertation : **Distance Learning Methods and Technologies : Benefits to the Maritime Industry and Developing Countries.**

Degree : **MSc.**

This dissertation is a study of distance learning methods and technologies. A brief history is given from inception and traces its continuous development from initial implementation to current practices. A comparison with traditional learning was done, outlining the various attributes of the two concepts, where intrinsic and extrinsic influencing factors are described.

Despite the fact that distance learning has been practised formally in one form or another for the past hundred years, it has not and still is, not fully regarded and accepted within the educational system. Since its inception in the form of Correspondence, it has been looked upon as an inferior type of learning without any academic credibility. Accordingly it has more or less been tolerated as a means of delivering education to the 'masses', rather than an alternative method of education. It has thus been viewed as a method of study for students who do not fulfil academic requirements for higher education, and therefore considered an 'easy' way of gaining academic success.

However changing social trends, the inability of traditional learning institutions to accommodate increasing numbers of students, and the technological progress in communication and computerisation have been largely responsible for a perceived change in attitude. The learning process and the various components as applied, have been examined with the focus on necessary attributes, along with the learning methods practised. The relationship between the teacher and student together with their respective responsibilities are discussed, being considered vital factors in the learning process.

The technology utilised is described in a general context without descriptive technical detail, which is outside the scope of this dissertation. A distance learning course design is described indicating the procedure and the staff involved. Its application to the maritime industry is discussed concisely, attesting to its validity and the benefits to be derived. Initiatives for developing countries are suggested, where the concept can assist in the training of personnel, and in the development of maritime institutions.

The benefits of distance learning are increasingly being recognised within the maritime industry, though primarily as a means for compliance with international regulations. The concluding chapters in addition to summarising the content of the dissertation, also provides recommendations for implementing and applying the distance learning concept within the maritime industry and developing countries.

KEYWORDS : Distance Learning, Learning Concepts, Maritime Initiatives, Traditional Learning, Learning Process, Delivery Methods.

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INTRODUCTION

In an holistic context, social and economic growth are invariably affected if the majority of a country's populace remain uneducated. The development of distance learning has therefore evolved through a social need to educate sections of the populace unable to access education through formal learning procedures. This was compounded by the factor of remote areas, where distance served to be an impediment.

Generally learning establishments in the traditional approach provide curricula, which enrolled students are required to follow at a learning rate set by the teacher. In determining this rate the teacher must bear in mind specified time frames allocated in the form of periods, commitments to other students in other classes, and the combined mental acumen of the class majority. The teacher is however capable of generating and sustaining motivational interest when visually appraising a class, and determining a comfortable rate of learning. However individual student access to the teacher is at most times limited, mainly confined to class periods or at the end of the day prior to his/her departure. As such, the less mentally motivated students lack the benefit of understanding and are invariably left behind.

The need for personal, social and financial ambitions through academic progress has customarily viewed attendance at traditional learning institutions as a means of achieving such individualised objectives. However attendance or non-attendance is influenced by a number of factors ranging through personal and social perspectives. The stressful demands of social existence placed on the individual today, limits the possibility and or capability of institutional attendance for a large number of potential

candidates. Circumventing this educational barrier has made distance learning an attractive option allowing candidates to further their development and educational ambitions without experiencing the extrinsic changes associated with their financial status through possible loss of job security and diminished income.

Technological progress has however, greatly influenced the methodologies of learning together with the standard operating procedures onboard vessels. Many changes have occurred in the approaches to maritime education and training, and also onboard practices. Distance learning is now being viewed in a favourable aspect, mainly as an effective means of training and developing personnel expertise and professionalism. The advances in satellite communications with its attendant reductions in the costs for its service, have also extended the range towards a more viable prospect.

New training methods have given rise to positive considerations. Despite evidence to support this fact, distance learning is in many instances, not afforded the credibility it justifiably deserves. Institutions are more influenced by the economical benefits derived from increased enrolment with relatively little developmental costs, than in being fully committed to the concept.

There are also reservations amongst learned educationists, viewing distance learning to be insufficient and incomparable with that of traditional learning, though reports from studies reveal otherwise. The advent of computerised technology has broadened the scope of delivery (the heart of any distance program), and has virtually reduced the "distance" together with various concerns contributing to erroneous perceptions. This dissertation therefore addresses the feasibility of the distance program, and its utilisation in the maritime industry and developing countries, by outlining the contributing factors and elements for implementation.

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CHAPTER 1

THE DEVELOPMENT OF DISTANCE LEARNING

1.1   Distance Learning - A Definition

In defining distance learning the basic concept must initially be understood to form an appreciative view. Accordingly, the concept in a broad general sense is the provision of learning opportunities away from the traditional classroom environment, to achieve similar objectives and intended outcomes as required for training institutions. This system of learning has been in existence since the early 19th century being initiated with correspondence education.   Since this introduction distance learning has adopted numerous descriptors.   The more popular ones being Open Learning, Distance Education, Distance Teaching, Off-Campus Training, Self Study Programs and Correspondence Educational Courses. These names are expressed to perhaps suggest different connotations, but they all have the same primary objective, operating on the same basic principle - transcending time and space between teacher and learner in providing education.

Consequently there are various definitions which all mean basically the same. However the preferred definition by the author is a simple and self explanatory one provided by Derek Rowntree (1992),

Distance Learning is learning while at a distance from one's teacher - usually with the help of pre-recorded, packaged learning materials.

Achieving desired outcomes similar to traditional institutions creates challenges in designing suitable programs. These incorporate the essential criteria for learning without the physical presence of the teacher to assist in providing a motive force for students. This factor has been considered ineffective for quality distance education and learning, and has more or less been associated with practical instruction for enhancement of skills rather than for academic purposes.

In stating the widely accepted expression that "we learn 20% of what we see, 40% of what we see and hear, and 75% of what we see, hear, and do", the advent and utilisation of modern technology is considered to be very appropriate in achieving the ideal 75% retention. This however depends on certain factors of which the level of the teacher/student interaction is of primary importance in the process of learning.

1.2   The Concept - A Brief Description

Distance learning was developed primarily to seek the interests of those unable to attend formal learning institutions, affording opportunities not previously available. Consequently the need to transcend the barrier of distance in providing such education became prevalent. The concept ideally served to remove circumstantial impediments, with appended benefits to all concerned taking the various aspects into consideration.

The basic characteristics in the concept of distance learning are the application of adapted teaching methods, utilised in educating students outside and away from a traditional learning institution, being effected through a communicative medium. It integrates and combines the roles of the teacher/tutor, the student, and most

importantly the current and available communication technology. Consequently, achieving the objective requires a different attitude with regards to the teacher and the student than that traditionally practised in educational establishments. Support and commitment by the institutions and teachers in particular, to the development of the concept are key factors essential to its success.

Though simplistic in its format, a lot of effort and preparation are required to effect and implement distance education and learning programs. In addition to the support and commitment from teachers and institutions, a large measure of responsibility is placed on the student to learn and understand on his own. The 'distance' in different perspectives (based on the student's attitudinal approach), can be both a blessing and a curse. Ideally, one can visualise the development of the concept through individual contracts between teachers and students for successful outcomes through adherence to each other's responsibilities.

1.3   Historical Background

Distance learning had been practised and developed over time in one form or the other, with recognition of the need to provide educational services to a larger number of people away from formal learning institutions. Dodds (1991) in his review, traced its origins from the practice of 'education by letter' through the medium of letter writing or correspondence. He attributed this early effort of distance education through correspondence, to the religious letters of St. Paul in educating people on the tenets of the Christian doctrine. Another example mentioned was a similar method used by the Muslim prophet Mohammed (PBUH) in passing on his teachings to his followers who lived far away from his location.

The invention of the printing press during the 16th century was also identified as an early contribution to distance learning development in an extreme sense, initiating

the shift from the then traditional form of learning solely based on lecturing. In this aspect, printed books provided knowledge previously gained through the lecture system, diminishing the need for students to depend solely on the lecturer. Printed books therefore provided the means of learning at a convenient and suitable pace without the need to memorise what was delivered by the lecturer. Subsequently, a shift was created where lectures clarified the content of printed books.

Positive development of distance education as accepted today was started almost simultaneously in the early part of the 19th century in Sweden by Meuller and Hans Hermods, and in the United Kingdom (UK) by Isaac Pitman and William Briggs through correspondence with then ardent students, who moved to other locations and were unable to continue with face-to-face learning. Success of these ventures lent recognition to its potential of educating a larger number of the geographically dispersed populace. The Morril Act of 1873 in the United States of America (USA) saw the growth of USA universities offering correspondence education. Other countries such as Australia, New Zealand and Russia explored and developed its use in the early 20th century. Correspondence courses were then given recognition through integration within the education system and subsequent introduction into university degree studies for both academic and technical courses.

The invention of voice transmission by Marconi in 1901 and its subsequent widespread availability saw the use of broadcasting being introduced. The first successful broadcast took place in Wisconsin, USA in 1919 creating a new dimension in facilitating the application of distance education methods and its feasibility. This was subsequently recognised and quickly adopted by other countries, namely in UK, Australia, New Zealand and Canada during the 1920s and 1930s.

This method was also introduced in schools and led to the availability of adult education programs. Broadcasting was further enhanced through the medium of television invented in the mid 1930s, when the scope of this broadcasting feature was

recognised with the growing availability of television sets. The use of television for education generated a lot of enthusiasm and was first initiated in Hagerstown, USA in 1957. This increased the efficiency of distance education at that time and was recognised as an additional learning resource proving to be very beneficial and to an extent cost effective. Countries during this time, began to explore the feasibility of integrating the already practised methods of correspondence, broadcasting and tutor interface into convenient learning packages in the development of the distance education/learning concept.

1.4   Modern Day Development

In determining a realistic approach to distance learning, communications and its accessibility play a vital role in its feasibility and efficiency and are synonymous to its growth. However until recent times it has been viewed with a certain amount of scepticism by the academic and scholastic community. As such it was more looked upon as an alternative for the individual who could not comply with the academic requirements of established and recognised educational institutions. It was therefore not considered an ideal academic pathway to professional qualification and had a low status in the academic hierarchy and scholastic appreciation. This was further compounded by the fact that teachers (perhaps not fully understanding the concept or unwilling to change) did not give the necessary support essential to its success. The other aspects of the cost factor and the question of who pays for the availability, also did not encourage rapid progress.

As previously mentioned, the availability and sustained reliability of communications, lie at the heart of success in the distance learning concept. Positive progress in communications and computer technology provided a catalytic medium in broadening the scope, influenced by the gradual and continuous reduction in costs

for availability of the technology. The increased realisation of the desktop computer and electronic systems being more a tool in coping with social demands, assured its affordability and availability to the average individual. Computer Based Training (CBT) and other associated interactive software, facilitated the tenets of traditional learning to be optimised in distance learning applications. This has proven to be very beneficial in enabling the user to be more self sufficient in learning through production of more progressive and detailed instructional material.

Change which replaced one by other

1.5   A Paradigm Shift

Distance education and distance learning have the same basic concept and can be used interchangeably with little variation in interpretation. However specific application conveys the suggestion that distance education is utilised in all aspects where emphasis on theoretical knowledge for professional qualification is a prime motive. Distance learning on the other hand is associated with learning situations where emphasis is placed on acquiring skills based competence and job expertise and is effective when combined with or related to the work environment.

Additional emphasis placed on professional expertise within the working environment has given impetus *Cause* to a progressive necessity of distance education and learning. Previously the professional gained social recognition on the strength of academic performance prior to consideration of expertise and experience. However where this thinking still remains, it is not wholly perpetuated.

In an interview by the author with Ms Merle Carrington (Senior Account Executive with The Royal Bank of Trinidad and Tobago Corporate and International Group) in January 1998 on the issue regarding staff training and development, she indicated a shifting focus on staff requirements. She stated that though proof of academic ability and performance is a prime consideration, the broad expanse of knowledge in

banking methods necessary for efficient performance and customer service, could no longer accommodate staff acquiring detailed knowledge in all banking operations. This was further compounded by the fact that such expertise, gained through traditional learning methods, required lengthy periods of learning away from the work place. Since current reduced staffing occasioned optimal use of personnel, she could not afford members of her staff to be away from work for lengthy periods of time.

Accordingly, proposals were being advanced in focusing more on the fundamentals of computer data accessing, in procuring necessary information on demand in a timely and efficient manner. This is facilitated with the use of CBT packages whereupon personnel can upgrade their performance and enhance their knowledge and expertise at convenient times. It is in this aspect that the concept of distance learning rather than distance education is applied.

Academic knowledge gained, though still essentially required as proof of mental acuity and understanding has limited acceptance in the working environment unless supported with relevant experience and expertise. In a practical working environment, the use of distance learning is very apt and beneficial in achieving relevant objectives.

CHAPTER 2

TRADITIONAL LEARNING vs DISTANCE LEARNING

2.1   Traditional Learning Concept

Traditional learning is described as learning in an institutional environment, and incorporates the infrastructure, psychological influences, personal development of faculty and students, and teaching methods applied in a broad context. Ideally such institutions have more or less been accorded repositories for socially acceptable individuals, and seek to create an individual, who will ultimately have some aspect of commercial and social value being substantially beneficial to the society at large. Consequently traditional institutions ideally relate closely to the social environment fulfilling the needs of the market place.

The prime objective of the traditional learning institution is to develop the 'correct' mental aptitude and acuity to assimilate ideas with accompanying logic. This is achieved by exposing the student to a substantial quantity of theoretical applied knowledge. This is acquired generally through the media of texts, lectures, static teaching aids, and practical applications in laboratory work and research. This format of learning has been practised for many centuries, and has proven to be very effective in promoting educational objectives. In this regard individuals are assessed and evaluated on the basis of their scholastic ability, to perform essential social

services within the market industry on the basis of a socially approved certificated hierarchy.

A successful and reputable institution creates a learning atmosphere through the psychological effect of its environment and ergonomic value. Accordingly the institution provides a wide range of services for the student throughout his/her period of study with access to a variety of associated learning resources, which would not have been possible for an individual. These include qualified and knowledgeable lecturers or professors, library facilities, simulated equipment, laboratories, teaching aids and equipment, recreational and sporting facilities, relevant administrative matters like record keeping, and opportunities for social interaction. As such the student is able to develop mentally, intellectually, and physically, to culminate in an all-round, well educated, balanced, and disciplined individual.

Institutions are generally divided into faculties or departments with associated tutors and staff, being headed overall by a chancellor, principal, or director depending on the size and status. The curricula is based on the level of certification, which determines the depth of knowledge required, and is generally static and inflexible with a high theoretical content. Subject material is (or is supposed to be) updated or reviewed frequently to be in line with modern or current social trends.

The process of learning, however, is somewhat similar to that of a manufacturing assembly line, where lectures are given with apparent scant regard to the sensitivities of the students. Beard *et al* (1984) expressed some comments by students, in that they thought courses were overloaded, lectures did not facilitate proper knowledge assimilation due to the rate of delivery, were too specialised, and they were required to do a number of unrelated courses. Beard *et al* (1984) also noted the comment from a student in Maris (1964) stating 'you want to do so much, and you are only given the chance to do so little'. This thinking is still prevalent today and it reflects the frustration felt where the learning does not appear to be attractive or motivating.

Lecturers, on the other hand, are of the opinion that students in fulfilling entrance requirements, have, or ought to have, a particular level of knowledge prior to attendance. Consequently the view is held that students are generally not mentally prepared for the expectations of higher learning. This in the main, results from being educationally spoon fed at the secondary level, and lecturers are virtually unwilling to adjust their teaching style and delivery. As a result, attention is often paid to the more academically inclined within a particular course. Lecturers also (in many instances) adopt an air of self importance becoming focused and specialised with their particular courses. They therefore create a sense of bias to their specialisation, in that they do not readily appreciate students who participate with the intention of making up course programs, which may be perceived as unrelated.

2.2   Traditional Teaching Methods

In a general context, traditional institutions apply various teaching methods to effect their aims and objectives and enhance delivery. As such the methods employed are:

1. *Lecture Type* where the learning activity is listening, with understanding augmented and supported with reading material in the form of handouts, texts, and note taking.

2. *Group Discussions* whereby the class is divided into groups and the students interact with each other in discussing particular subjects as stipulated by the teacher. This as previously mentioned has proven to be very effective in enhancing understanding and providing clarity. The interaction also provides some form of motivation in learning as students are required to have a certain level of knowledge prior to participation.

3. *Demonstrative Type* has been very effective especially in the instance of laboratory work, where expertise is gained in mastering required tools of

the trade. There is also greater retention of subject matter and interest is increased in performing the particular activity. It also breaks the monotony of lecture sessions, and increases motivation levels.

4. *Computer Assisted Learning* has been increasingly utilised and found to be very beneficial. It is fairly similar to that of distance learning in that students are given the opportunity to review subjects at their own pace, compatible with their rate of understanding. Students also develop a greater appreciation of subject matter, lessening the dependence on the lecturer. However this is dependent on the feasibility of the institution to supply adequate computer terminals, and the quality of the information management systems.

5. *Audio Visual Techniques* as in video presentations incorporate the visual aspect of learning where lecturing is insufficient or impractical to foster understanding and various interpretations can be derived. This is especially useful in combination with other teaching methods, as graphic images relevant to subject matter are displayed. The attendant capability of the technology to 'pause', 'fast forward', 'rewind' and 'zoom' (varying sizes of picture frames), enhances the teaching and learning process.

6. *Simulation* has been recognised and accepted to develop expertise without actual experience. Such recognition and acceptance is reflected in being mandatory within Code A of the STCW 95 for radar and ARPA. This creates a simulated or virtual environment identical to the work place, where the learner has the psychological reality of being in an operational capacity in using operational equipment having realistic functions. In this aspect competence can be developed, measured, and assessed for different scenarios, weather conditions and types of vessels, without damage to operational equipment in the work place, during the training process. It

also lessens the time factor required for the individual to gain the necessary expertise.

The methods described are essentially teacher centred, with the teacher controlling the rate of delivery and subject content. In this way teachers are able to gauge the progress of students through guidance, assessment, and evaluation, thus being very influential in their development. The substantial benefits gained from effective utilisation of the aforementioned teaching methods lie chiefly with the dedication, technological knowledge, and innovation of the lecturer or teacher concerned. In many instances there have been short comings in that older teachers are reluctant to change or amend their methods of teaching. One possible reason could be the rapid changes in modern technology, where teachers are therefore required to develop the current expertise on their own accord, which most are reluctant to do. When consideration is given to the fact that the average age of teachers is fifty-five, it is most probable that teaching methods as currently practised are not fully exploited.

2.3   Psychological Influences

Students upon starting a program of study, usually encounter and have to deal with a variety of psychological problems which are either intrinsic or extrinsic in nature. Beard *et al* (1984) comments on this aspect within a learning environment where such problems singly or together greatly influence attendance and therefore require a range of counselling.   The on site teacher has traditionally played the role of counsellor, having been able to observe certain behavioural characteristics. This has proven to be very beneficial to the student in regaining lost confidence, where subsequently he/she at most times is encouraged to continue.

The psychological influence on an individual within a traditional learning institution, determines rate of development, motivation, and the eventual outcome. The personal

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interaction with teachers and other students (and within group formations), creates a sense of belonging which is necessary in fostering effective communication, together with an individual's mental and physical growth and development. Dumont (1996) mentioned the view, held by critics, citing that high quality education required the interaction experienced within the classrooms of traditional learning institutions. Although high quality education can also be achieved within a distance learning environment, this necessity is more prevalent within the formative and secondary stages of learning development.

At the tertiary level of education, many students find a greater level of comfort with regards to communication and belonging. Jorn et al (1996) noted the comments by students on a distance learning course conducted by Ann Hill Duin using synchronous technology. There was a preference to have the instructor in person to effect proper communication. In this regard one benefits from the various aspects of teaching styles through didactic methods, communication and group discussion.

Enhanced communication greatly relies on the level of rapport attained with another individual, which is achieved through the development of a relationship in getting to know that person. Jorn et al (1996) also noted other comments by students to the effect that they did not feel comfortable in interacting with other students electronically even if it was synchronous, because they did not get the opportunity to know them. There is indeed some measure of difficulty in achieving this through non personal contact, although there have been reports of people building very good relationships through the use of electronic media.

The psychological effect of isolation (as experienced within a distance learning environment), limits the feeling of belonging to an institution, and the student more or less feels like a visitor or intruder and does not establish peerage with other students. There is understandably some measure of reluctance in establishing contact, despite assurances to the opposite, and the student will not optimise benefits gained from interaction. Based on interviews with distance learning students in

Trinidad, the sense of belonging and isolation has varying psychological effects. Even though an individual may graduate from an institution through a distance learning program, there is no confident assertion of attendance. The student also does not feel part of the alumni in being, in the one instance, regarded as different or an outsider having a lower academic quality. This effect is however lessened with mature students and those having a fair amount of security within their job, only wishing to enhance their personal educational development. They therefore generally do not have the imposed stress of education being the means to an end for gaining an income.

A nullifying aspect albeit limited for now, is the increase of students in classes in response to the growth in populations. Within recent years such growth has been very substantial to the extent that teachers are presently unable to devote attention to their charges. Such increase in numbers compounded by the time factor for scheduled periods does not allow much opportunity for students to gain clarification and understanding in subject matter, and therefore to a certain extent negates the benefits derived.

Since the increase in student numbers is also proportional to the work load placed on teachers, response time for feedback and assessment is therefore increased, further compounded by a growing shortage of teachers. Although teachers still generally provide students the opportunities for subsequent interaction, students are increasingly hesitant to approach teachers outside the classroom, and prefer to resolve questionable issues on their own accord.

2.4 Infrastructure

The ergonomic aspect of learning is very valuable in creating the environment where students desire to learn on their own accord. Traditional institutions seek to create such environments within their infrastructure, where the prime motive is the discharge and acquisition of knowledge. Students upon gaining admittance are geared towards academic success primarily through the limiting of peripheral distractions. Though students are not divorced from such distractions, their time at the institution is devoted to learning.

Just as a church impresses on the individual the purpose of prayer and religious inclinations, so too a learning institution impresses the purpose of study and academia in all its attributes. In providing this facility, institutions take into consideration the following:

- *Location* which determines physical access for students and faculty. Ideally this should not be too close to an industrial centre where there is difficulty in limiting distractions, but at the same time not too inaccessible where personnel encounter difficulty in attending. This occurrence could place additional financial expenditure in terms of transportation, on the institution should this facility be provided.

- *Size* where the allotted space should be adequate in accommodating sufficient classrooms, laboratory work shops, simulators if required, social amenities for both students and faculty, living accommodations, necessary equipment, research and resource facilities, libraries, record keeping, and administrative functions.

- *Maintenance* of the necessary equipment and buildings, the capability of which can be viewed as a criterion in assessing the quality offered. Psychologists have determined that the physical appearance of the

institution is conducive and crucial to the mental development and progress of the individual.

- *Teacher: Student Ratio* which determines the effectiveness of the teaching offered. It is also a prerequisite in maintaining institutional status within statutory guidelines in most countries, allowing the means of governmental subsidies.

- *Faculty* is a major determinant as the quality of the lecturers is directly related to a student's academic success. This not only applies to lecturer's qualifications, but also to the ability to impart knowledge and deliver effectively. Another consideration (mainly in attracting and retaining faculty) is the capability for faculty development to ensure that up to date information is relayed.

- *Certification* offered is proportional to subject matter content, and is used ideally to reflect the competence and capability of the individual to function effectively within the industry. It is noticeable with many institutions that content may not be in line with industrial and social requirements, or for particular certificated specialisation. It is however still used as a means to indicate an individual's proficiency sense.

- *Tuition Fee Structure* is the nemesis of all institutions as it is incumbent that financial resources are generated to facilitate quality learning, which must be matched with the financial capability of students to maintain viable enrolment levels. Therefore another reason for the need to increase candidate enrolment as previously mentioned, is to minimise tuition costs.

The prospective candidate in fulfilling the criteria for higher learning, needs to be assured that the probability of success is high once the study requirements are attained. Understandably he/she would not like the time devoted to study to be in vain, so the certification offered must be substantially and statutorily recognised.

The individual must therefore assess the quality and capability of the learning institution, to meet educational needs and objectives taking into account the infrastructure as a prime consideration together with other intrinsic and extrinsic factors.

2.5   Traditional Learning vs Distance Learning

Learning has at all times been a perpetual objective for both the individual and society at large. According to the Longman Dictionary of the English Language,

> *Learning* is:"1. the acquiring of knowledge or skill 2. knowledge or skill acquired by instruction or study 3. modification of a behavioural tendency by experience".

The pursuit of knowledge and the mastery of skills have at all times been a prime objective and usually accorded a high social esteem. Consequently traditional learning concepts are continuously being modified and enhanced to produce favourable outcomes. Varying levels of changes have therefore been made, where the focal point of interest has shifted from being teacher centered to a student centered one. Thorpe *et al* (1987) describes this viewpoint as a shift from the traditional concept of learning to an individualistic student response, based on student centered learning emphasising needs and requirements.

This paradigm shift, though strongly resisted by the academic faculty was in the author's opinion, not intended to replace other learning concepts, but to provide a suitable social alternative within the framework of education. Understandably this change was met with a large degree of scepticism by the academic faculty, who did not regard distance learning with the confidence to emulate and embody learning characteristics. Faculty and critics alike maintained ardent support for the "tried and tested" traditional concepts. Dumont (1996) noted that '...faculty have a disdain for

distance learning, firmly believing that students' work lack the quality and vigour of work'. Though there is some merit attached to the statement, the opinion can be interpreted as being an emotional response to the fear of change, rather than one based on evaluative criteria.

Other survey reports do not support this view when distance learning success rates are compared with that of traditional learning. An earlier assessment by the US Congressional Office of Technology Assessment in a report on distance learning pointed to the fact that distance learning was favourably compared with that of traditional learning as evidenced in the statement, '...in most instances, distance learning appears to be as effective as on-site, face to face instruction in the classroom'. Another comparitive analysis conducted by Dumont regarding performance, observed that distance learning students produced work equal to or surpassing that of on-campus students.

Survey reports by the National Center for Education Statistics (NCES) suggest increased support and acceptance by the society at large. A report indicated a substantial increase in distance education courses being offered, with 90% of all institutions in the United States with an enrolment in excess of 10000, providing this service. Warden (1998) indicated that the success rate of distance students at the Open University of Catalonia over the past five years was 60 % of enrolment and 80% for students actually sitting the exams.

However there are certain aspects of traditional learning which cannot be provided within the framework of the distance learning concept. The opportunity to network and interact in a face to face medium, do give more encouragement, understanding and motivation among students, especially where clarification of information is required. Group study and discussion have been found to be very effective not only for the aspect of greater knowledge, but in building confidence in the expression of personal viewpoints clearly and concisely. Such networking and interaction has a greater effect when students get to know each other through personal contact.

Though this assessment is widely accepted, the author has realised that this concept is being currently challenged. The growing and avid use of telecommunications technology has progressed to a level where a similar effect could be achieved through the electronic and virtual medium.

Traditional institutions however (especially the more theory oriented universities) are prone to be more academic in approach, and adopt an environment where the faculty becomes myopic, and does not readily respond to their environment and social needs of the individual. This is not generally suited and conducive to the overall development of present day students, and differing views are expressed in surveys conducted with faculty and students on institutional learning. University students have generally commented on the mental pressure one undergoes on account of the magnitude of the curricula content. Many students accordingly finish their courses of study more with relief of successful completion than in appreciating the knowledge gained. Students in focusing on passing examinations find difficulty in applying what was learnt to operational situations. Changing industrial trends in utilising computerised technology, also do not require as much need for theory based individuals as a measure of competence.

Despite these seemingly negative and contrasting comments, traditional institutions are held as the authority for educational quality. It is still considered, though to a lesser extent, that attendance at these institutions is for the academic elite, and those not fulfilling the criteria are usually not considered meaningfully. To support this one only has to look at the selection criteria for lucrative positions or employment. The higher qualified you are, as evidenced by appropriate certification from a recognised institution, the more credibility is proffered. Therefore, in the quest for higher esteem and job security, the path still leads through a traditional learning institution. However they are structurally limited in facilitating all possible candidates, and a lot of people with the necessary criteria are unable to gain admittance.

Another area of consideration for distance learning is in accommodating those individuals who previously did not fulfil entrance requirements to learning institutions, or who, for one reason or another, were unable to attend. Though distance learning was, and still is, in some aspect looked upon as education for the academically handicapped, this is no longer applicable as the people involved in distance learning do have the necessary criteria for higher education. Distance learning therefore provides the alternative where those left out or temporarily socially distressed are given the opportunity to fulfil their ambitions at convenient times. Accordingly distance learning can be favourably viewed in this regard as it caters more for the individual. Therefore the individual can maintain sources of income, attend "school" at his/her convenience, maintain living situations and conditions without social stress or trauma. The greater benefit is in formulating what is required and applicable to the working environment. In this regard the frustration previously expressed is greatly diminished.

The cost factor is also a crucial consideration. In maintaining quality with regard to resources, institutions have to increase their fees in accordance with varying economies. This places a great deal of hardship in meeting financial commitments. The Times Higher Educational Supplement (April 1998) reported the strong views, expressed by students and parents of students attending universities, objecting to the increased rates in British institutions. It was noted that the majority expressing their views found it most likely that attendance would be terminated unless some favourable consideration was given.

In this context also, distance learning provides a suitable alternative. Although there is considerable expense in developing distance learning programs, the cost of tuition is substantially less, and the individual is additionally spared associated costs such as travel, accommodation, and meals on campus. This not only applies to academic learning, but also in the industry where developmental and specific training is

required for a particular work environment. Employer's employee investment when such training is necessitated is considerably reduced.

Distance learning, however, places a great responsibility on the individual, who has to be highly motivated and very conscientious when embarking upon such a program. Due to the fact that most distance learning students take up this option after a considerable time away from academic studies, it is very difficult to develop an appropriate routine and study rhythm. This is difficult even if the individual attends an institution, and more so if he/she has to do it in isolation.

This factor of isolation has been given quite a lot of attention, being recognised as a highly probable reason for drop out by candidates. Though candidates have various personal reasons for terminating a course prematurely, the psychological effect of isolation is very real and has been described as 'Electronic Anomie'. This social phenomenon experienced in distance learning, expressed by Jorn *et al* (1996) is induced through isolation, whereupon the student finds it easy to disengage, procrastinate, and avoid interaction. In an interview with Mr. R. Gittens, an electronic equipment technician with the University of the West Indies Distance Education Center (UWIDEC) in January 1998, a somewhat similar opinion was proffered albeit in a slightly different context. He cited students' preference for teleconferencing, which allows them to disengage and avoid interaction. He related this akin to the student in a traditional class room hiding at the back of the class to avoid detection by the teacher. This phenomenon could be demotivating, as in its own way it defeats the whole purpose of distance learning.

The success of distance learning is linked directly to extrinsic factors relating to geography, market needs, social acceptance, educational policies, personal needs, economic viability and technological progress. Technological progress has been very influential in almost every aspect of social life including distance learning. Dumont (1996) states that

"technological advances, the workforce's increasing need for continuing education, business needs to train or retrain employees, the need to increase educational opportunities in rural areas and among dispersed populations have led to exponential growth in distance learning programs".

Since its introduction in the early 19th Century, an essential characteristic of distance learning is delivery and feedback of subject material. The medium of communication provided through computer electronic technology, has within the last twenty years tremendously increased the scope of distance learning. The lack of interaction between both tutor and peers, occasioned the feeling of isolation and was considered a "major flaw", rendering this aspect of learning to be passive. However communication has greatly reduced the geographic distance limiting the feeling of isolation, as there is increased "face to face" interaction through the availability of synchronous electronic media. Rebecca Warden in her article, states that there is more of a closer relationship between distance students and tutors than with on campus students and tutors. Greater flexibility is also experienced by both tutor and student with the use of asynchronous communication. The ease and convenience with which this is effected has made the concept of distance learning an attractive one.

CHAPTER 3

THE DISTANCE LEARNING PROCESS

3.1   Growing Importance

Distance learning has grown in importance as a medium for higher education and enchancing job skills in the work place. This is evidenced by the fact that increasing numbers of institutions are offering wider ranges of distance learning courses, which are being incorporated within national educational systems, and socially recognised. The industry has also recognised the benefits to be derived due to increased use of technological processes. For this purpose focus is increasingly being shifted from the previous requirement and acceptance of a knowledge based individual, to a more functional one having a working knowledge of systems usage.   Additionally traditional institutions are no longer capable of meeting the demands of a rapidly growing populace seeking higher education or enhanced skills training.

There is however strong resistance being maintained by traditionalists who largely view the growing recognition and acceptance of distance learning, will lead to a 'watering down' of educational standards. A strong opinion has been expressed by Grey (1998) in that higher education should remain an educational intellectual elitist system, which determines a 'high quality' academic individual, developing independent, critical, sophisticated thinking. His report criticised the progressive

abandonment of traditional teaching for the 'trendy' child-centered approaches of distance learning. He states that:

> "...it is incorrect to contrast traditional learning with student-centered teaching. The aim of traditional university teaching has been to encourage independent critical reflection and development...to provide a basic framework which guides the student towards individual learning, most importantly through reading."

Grey also mentions the fact that with enrolment expansion, a large number of intellectually challenged students has gained admittance, who are not capable in meeting the requirements for the reading of a degree. He is of the opinion that these students have perpetuated the call for a more student-centred orientation, which allows the mediocre tail to wag the able dog. He further states that able students do not benefit from the concept of distance learning that incorporates the plethora of learning goals, transferable skills, log books, team-work projects, and multimedia interactive learning, but can have greater benefit through lectures, reading, and writing.

The point of view described above represents more or less a myopic approach to education, which defeats learning objectives, and contrasts with suitable teaching methods outlined by learned educational theorists. In this aspect learning is catered primarily for the 'verbaliser' type of student as described by Sparkes (1998), and does not reflect sufficient suitability for present day social needs and the industry. Adherents to traditional learning are concerned and threatened with the growing trend towards distance learning and education, and the possibility that the traditional institution will be replaced. Consequently their usefulness will be challenged on both an academic and social level should persistence be maintained in resistance to change.

Norway introduced distance learning subsequent to an economic depression which correspondingly burdened the state's welfare system. The fact was recognised that

their people needed to be retrained and adopt new skills to be of value to the industry and society. Distance and flexible learning were deemed to be suitable in achieving the objectives within a suitable time frame. A study was conducted by notable educational institutions for its viability, and a comparison done with traditional or 'truncated' (Norway's description) learning, which was identified as limited in concept and design. Distance or 'intact' (again Norway's description) learning was viewed to be more beneficial as it shifted the responsibility of learning to the student. This served as a motivating factor in that students learnt with a focus on relevance to their particular social or work environment. After overcoming the inevitable teething problems associated in the development and introduction of the distance learning concept, they realised positive indicators of success on both community and individual levels.

Despite pockets of resistance to distance learning, an increasing number of institutions are changing their perspectives to meet social and industrial demands, and are incorporating distance learning courses within their programs. They are also integrating the concept of distance learning within their on-campus programs with positive indicators. Consequently institutions have reported increased enrolment due to distance students within their distance learning programs. The National Center for Education Statistics (NCES) (1998) in revealing the findings of a survey of 1200 higher education institutes conducted in 1995, states that 33% offered distance education courses, with an additional 25% planning to offer distance courses in 1998. Other institutions reported that their inability to produce distance programs, centred mainly on their incapability due to financial constraints in development, and not on resisting the change.

3.2   Institutional Concerns

Basically the concerns of many institutions are centred around the financial capability to develop the necessary infrastructure and programs to offer quality distance learning. The larger institutions have been able to capitalise on and readily respond to social and industrial changes, however the change though viable in the eventual outcome, is determined largely on social demands and culture. Institutions also have to adopt more of an open system to liaise more closely with the social and industrial environment, and be fully capable in utilising the available technology within their programs.

Though financial concerns remain an inherent factor for many institutions, other considerations influence the adaptation to the distance learning concept.   The University of South Australia (1993) summarises such considerations as fears based on a new teaching experience. Specifying these fears would more or less include the following:

Institutional Transition is considerable for in addition to the attendant costs associated in developing a suitable quality distance program, other concerns originate with state bureaucracy, policies, legal issues, authorisation, lack of administrative support, and incompatibility with institute's mission and objectives. There is also the factor of acquiring dedicated staff for managing, administrating, and maintaining the program to ensure efficiency in offering the service. Since the distance learning concept is essentially student centred, student matters and needs must be taken into consideration, especially in alleviating their fears of isolation, confidence, distance, tutorial support, feedback, and encouragement.

Faculty Transition from traditional learning largely incorporates a paradigm shift which inevitably affects all concerned. Faculty are in quite a few instances resistant to the change as their comfort levels are disturbed, and they have to adapt to new

teaching styles and methods, which most likely involves some aspect of being retrained. Since in most institutions the average age of lecturers is between 45 and 55 years, there is difficulty in adapting to the new demands created by the concept and technology.

Additionally during the developmental stages, the workload of the faculty is substantially increased without much motivating incentives. A lecturer therefore finds himself having the responsibility with the attendant demands for a number of students off campus in addition to those on campus. Consequently his personal time is remarkably reduced as he is expected to be committed to his charges and be available to the off campus students at their convenience. It was duly reported in the Swedish press of teachers seeking alternative employment due to demands and pressures experienced with the additional workload, with mention being made of the marking of papers and the time frame determined for feedback, as a burdening responsibility.

Trained Staff is a necessary criterion within the distance learning infrastructure. Courses have to be developed on the premise that the student is without the benefit of an on site tutor, and the psychological attributes of traditional learning. Accordingly courses have to be structured in such a manner that the student can achieve learning objectives with little interaction from faculty. Additionally course lecturers do not have the benefit of assessing a class to determine a suitable pace of teaching, or preferred styles to adopt on the basis of students' learning characteristics. Courses must be designed in such a way that it would be appreciated by students having different learning characteristics.

In achieving the required objectives, courses therefore appear simplistic in nature, which no doubt accounts for the adverse comments proffered by those in favour of traditional learning. Though teaching styles advise that lecturers should impart knowledge as simply as possible so that their students can understand, developing a distance course is no simple task especially if sophisticated electronic technology is

being used. It has been observed that producing a 45 minute lecture with a multimedia medium generally demands approximately 100 hours of production time, which bears evidence of the effort and technical skill required. Since a different teaching style is necessary, the lecturer not only have to adjust to a new style of teaching, but he must be functionally capable in utilising the associated technology.

Dedicated Staff is required to deal with routine managerial and administrative tasks, which will address any concerns the student may have upon registration and prior to settling into the course. Ideally a separate department should ensure efficient operation of a distance program, but since this incurs considerable expense, its implementation is often given a low priority.

Medium Used is critical to any distance program. It has been generally realised that if one type of medium or one particular style is used, the drop out rate is considerable. An effective distance course should adequately be suited to the different learning styles of the targeted students, which invariably would necessitate a combination of various media.

Due to the fact that a general criterion of a distance program is tutor availability on a fairly continuous basis, suitable interactive media must be utilised to foster favourable communication. Substantial costs are realised (there is a growing trend to reduce such communication costs to favourable and affordable levels) in maintaining such communication, especially in the instance of foreign or overseas students operating in different time zones. Determining who pays is therefore a major concern, so a favourable balance must be achieved where costs are shared or offset in some way or the other. In some countries such expenses are subsidised through educational programs, and tax benefits.

Continued Existence is greatly considered and no doubt a strong motivator as traditional institutions have more or less reached the maximum in relation to course fees. Evidence of this are the universal expressions of the difficulty experienced in affording higher education from the majority of the populace in various countries.

This is a determining factor especially in developing countries experiencing severe economic constraints. This augurs cause for concern as the vociferous expressions of dissatisfaction are coming from a wide sector of the middle class, which usually supports more than other social sectors, universities through continuous attendance.

Though it has been expressed that income is vital to maintaining the quality of tuition, it has not been favourably accepted. Traditional institutions faced with this situation must look at alternative financial sources of income for continued existence. The most viable option is in increasing the student enrolment, without increasing fees, which can be achieved through the availability of distance learning programs.

Though the concerns listed generally form the basis for decision making in establishing distance programs, benefits are derived from those who have implemented the programs. These relate mainly to :

- additional income occurring with increased enrolment.

- a growing reputation.

- lower maintenance costs once the system is developed.

- closer links with industry and society.

3.3   The Learning Process

In addressing the learning process of distance learning, it is necessary to look at the roles of education and the primary objective with reference to the present day student and the environment. It is a common realisation that recent generations are more perceptive, curious, independent minded, aware of their environment, and electronically attuned. In being aware of their environment they have a greater understanding of social and industrial needs, and have therefore over time questioned

the relevance of curricula devised by traditional institutions as it is in many instances no longer applicable to real life work situations.

The growing use of electronic technology in many facets of the working environment, has shifted the emphasis of detailed knowledge content to one of functional skills based. In the maritime industry with increased computerisation, ship owners no longer consider it necessary for ship operators to have detailed knowledge to perform their day to day duties. This is now performed by computer programs having a faster speed output. The need therefore is to have ship operators trained in the functional use of computerised ship board equipment.

Based on this industrial need many people today, unless sufficiently motivated, find traditional learning a waste of time and money without any guarantee of employment on completion. In many instances it has been expressed that a student upon graduation has to re-learn what he has been taught theoretically in a practical application. This involves a lot of time wasting from the employer's point of view, and productive hours lost in training the academically qualified individual.

Institutions in adapting to changes occasioned by distance learning, should place emphasis on the requirement to foster learning, not to teach. Björgen *et al* (1994) outlined the main roles of education to be :

- Transfer of knowledge (established and new)

- Selection from the whole base of knowledge

- Development of knowledge and understanding

- Quality Assurance and Quality Control

- Transfer of values. (Conserve and / or change)

- Social forming of individuals

- A symbol of the value of knowledge

- To balance the economy and labour market

Regarding stipulated roles, institutions have been more or less responsible in shaping the individual along socially established criteria. This is difficult in the distance learning concept as the individual is left largely on his own without peer and tutor influence. In an interview held with Dr. Aziz of the IMO on 5 February 1998, he was of the opinion that development of the correct attitude could only be formulated in the institution. Whilst there is merit in that viewpoint, it is also possible to influence the correct attitude through distance learning, but that is largely dependent on the level of motivation with the individual.

The learning process though simplistic in design as described in Fig.1 overleaf, requires a lot of commitment by both the teacher and the student. It bears resemblance to the communication process between a sender and a receiver. The medium of communication performs a similar function as the learning process, which is the heart of the distance learning concept, consisting of a range of communication media. Ideally it involves two way interaction between the teacher and the student. Such interaction is largely dependent on certain factors having a strong influence on success or failure. The salient recognisable factors are :

- determination of aims and objectives

- the communicative medium chosen

- the learning environment of both the teacher and the student

- instructional learner support

- feedback

Though these factors embody the process, achieving the objective lies to a great extent with the teacher/lecturer and the student. They each have complementary responsibilities, which greatly affect the learning process ending in success or failure for the learner.

Fig.1 **Learning Process**
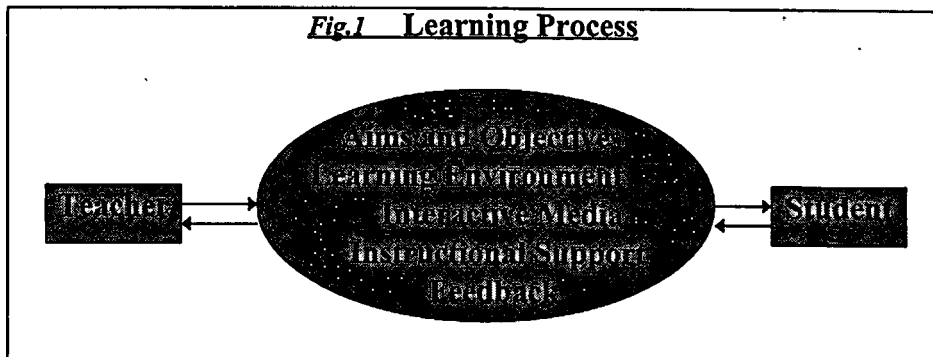
Since the distance learning student is more influenced by other motivational factors than the traditional learning student, there is a great responsibility placed on the teacher in adopting a distance teaching mode. It is therefore incumbent on the teacher as stated by Pennsylvania University (1992), to provide an effective course design relevant to the interactive media used, and presented in a concise, progressive format.

3.3.1 The Distance Learning Teacher

Traditional learning teachers have had to adapt and adjust their learning styles in facilitating the distance learning concept. Additionally they were required to become functionally familiar with the new technology required, which in progressing at a rapid rate, most likely appeared daunting in mastering. However with progressive training and growing familiarisation in the new systems there has been growing support for distance learning and its concept.

A favourable transition has resulted in the integration of distance learning methods into classroom teaching. However studies conducted by Björgen *et al* (1994) revealed there was a tendency to apply traditional learning methods into the distance

environment. This resulted more in distance teaching than in learning. In developing video tape material lecturers tended to adopt the same methods applied to the classroom, which were not wholly appreciated by the distance students concerned. However many students related to this method having a greater confidence in a simulated face to face setting in addition to their own learning efforts.

Accordingly emphasis is placed on developing material to teach the individual all that is required to learn, without the need for tutor interaction. This method is more applicable and utilised through correspondence as practised by the Open University where the medium used is by mail. The advent and use of electronic media however does not make this type of course development beneficial to the learner. A different approach is therefore required.

Lecturers in supporting distance students, need to be committed with the focus on student-centred learning. They are required to provide all relevant assistance when it is required by the student, giving adequate feedback on progress, and limiting the psychological factors that pertain to confidence, isolation, and their social environment. Though they are limited in this aspect, programs should be developed to stimulate the student to activity to encourage and enable learning. Such activities should also include indicators that measure progress, understanding, and the depth of study conducted through periodic assessments. A downward trend should therefore be easily recognisable, and it is incumbent on the tutor to make enquiries of or from the student.

There are many questions that concern the lecturer in the aspect of distance learning. These consist largely of remuneration, ownership of material, copyrights, similarity of treatment between on campus and distance students, marking of numerous assignments, feedback, level of student support required and availability of communication access. Depending on their approach it can be a rewarding experience in accomplishing and mastering a new concept. The University of South Australia (1993) identified some of the satisfaction experienced relating to topic

development, completion, peer review, teamwork, student support, relationships, and flexible working hours.

3.3.2 The Distance Learning Student

The responsibility on the student is in wanting to learn (motivation), augmented by realistic application. An optimum level is achieved when the distance learning process is applied to a job related function. The major requirement for student's success is the level of motivation upon starting the course. Surveys have shown that students who pursue the course diligently to completion obtain better results than their conventional counterparts. However the ease with which one can drop out appears an attractive measure when faced with unexpected problems. Some students also approach distance courses with the perceived notion that they are easier and therefore require little effort. When faced with the reality of the workload required, they lose interest. Studies conducted by Björgen *et al* (1994) revealed these students usually find the courses boring with too much subject content, while the more motivated ones find it very interesting with insufficient content. Though this study applied to the method and response of using video programs, it is also applicable in other areas.

The primary purpose of distance programs is to allow students the benefit of achieving learning at their own pace in their own time. They are therefore afforded the possibility of learning something in which they have a particular interest. In this aspect motivation is necessary in addition to having self control, effective time management, a work plan, and a suitable study environment. These inherent factors determine completion and success to a large extent on the student's part.

The student despite being motivated in some aspect upon commencement, needs some fundamental support from the institution or distance centre to maintain his zeal

and enthusiasm. It is vital that the course tutor establishes contact with the student at this time to assist in the settling in period, and provide a source of contact. Other support should include guidance in the use of the technology, contact with peers, information access, feedback on progress, and administrative support.

The learning environment of the student is also of utmost importance , though one can debate the aspect that it all lies with the student and he is ultimately responsible for his success or failure. This however determines whether the learning is pleasurable and appreciative, or an "uphill grind" becoming a burden. Perraton (1991) addresses the issue that students have varying motivation levels, and in many instances the less academically inclined favours the opportunity offered by distance education. The issue regarding a strong academic background and study discipline, shows a necessity for these attributes, as students without these inherent qualities, are usually inclined to drop out if the course becomes too difficult. Especially in courses leading to formal examinations.

Since the distance student largely functions on his own and is not withdrawn from his or her social responsibilities, the course design should facilitate as much as possible the learning situation. This assists greatly in ensuring that a high level of interest is maintained and diminishes other distracting concerns. Such considerations in course design would result in the enrolment of a more focused student with a consequential reduced drop out rate.

3.3.3 Aims and Objectives

In effecting the learning process, it is ideally necessary to establish specific aims and objectives, which are clearly defined, easily understood and achievable. Such aims and objectives lie at the heart of any learning development. Aims are usually general in nature and design, and are more geared towards a relatively long period of time,

while objectives tend to be more specific and precisely phrased having a definite, and identifiable result. They (objectives) are effected over a specified period of time which is relatively short, being usually derived from aims. A learning program is accomplished through stated aims and objectives, which provides purposeful direction and enables measurement of success levels for both the student and the teacher.

In considering aims and objectives for a distance learning package, the developer must pay heed to the student in determining what the student want to achieve, and what the student needs to know and learn, to achieve success. It is therefore necessary to know the students being targeted, and be aware of their existing skills and knowledge, educational level, professional experience, learning characteristics, and motivational forces. Once this is established, a curriculum is developed whereby consideration is given to content, teaching level, learning pace, teaching methods, learning sequence, materials to be used, media, communication, time allocation, assessment, and evaluation.

In its broad context, aims according to Print (1993) are derived largely through extrinsic factors, resulting from empirical, philosophical, and subject matter sources, together with curriculum conceptions, situational analysis, and educational forces. These provide the foundation for the curriculum of any learning development, and places focus on expected or desired outcomes. Objectives on the other hand, are either general, behavioural, specific or instructional with particular features relating to comprehensiveness, consistency, attainability, suitability, validity, and specificity. These attributes establish the framework and parameters that students need as guidance within the learning process of any course design, and it usually forms the basis for psychological influences that maintains student's interest.

3.3.4 The Learning Environment

The learning environment as mentioned above is an important factor, which determines the eventual outcome. It is vitally necessary that the arbiters of distance learning programs consider this factor in being sensitive to the students' situation and assist in alleviating the imposed stresses. Despite the fact that the distance student is largely responsible for his/her successful outcome, and should be highly motivated, this should not be taken for granted.

A distance student initially (in a general context) has some measure of desire or motivation to achieve a particular objective. What the student may not be able to fully appreciate, is the effect of his/her immediate learning environment, and the influence on achieving the objective. This does not mean to say that the responsibility should be shifted to the teacher or institution, and to fully accommodate the student. The student must be aware of and know that a high level of commitment must be maintained. The line where this must be drawn is not very distinguishable, but the teacher and the institution should however be aware of limiting factors and do what is necessary to assist.

In securing an ideal learning environment, it is advisable that the student should have a place or area where he/she is not too distracted, and is able to fully concentrate on the studies. It is also beneficial that the required tools for learning should be available. This more than likely would involve having access to computerised technology and information resources, since current teaching and learning strategies are basically dependent on these factors. Since the distance student generally has a job responsibility, psychological and physiological factors are determinants in regards to job induced stresses and fitness levels. How one physically feels after working, and the time taken to reach the study area are two important issues to be addressed, as these can be looked upon as additional stresses that the traditional learning student do not have to experience. Onboard a ship (worse if it is a small

one) the seafarer would have to put up with the ship's movement, noise, fatigue from operational duties, lack of available communication facilities, distractions from other crew members, and adequate space for learning tools to state examples.

Motivation however plays an essential part in combating (especially in adverse instances) an unsympathetic learning environment. Usually the expectations of a higher salary or position level within an organisation provides sufficient incentives, but the distance teacher or institution can augment this motive force in a psychological context. This is in communicating encouragement, offering advice, building a relationship, timely feedback on progress, and showing interest in what the student is doing, or how he/she is coping. Such assistance is proportional to the level of the distance teacher's commitment, which can consequently lessen the psychological feelings of abandonment and exclusion.

Many distance programs currently facilitate skills acquisition within an operational environment, which is provided by the organisation concerned. In this instance motivation and interest levels are maintained. What is being learnt is to some extent directly related to one's operational functions, which enables the relevance and purpose to be apparent. It helps learning tremendously if the student can apply or visualise what is being taught to a real life situation, without having to develop understanding on an abstract level.

3.3.5 Interactive Media

The conduct of a distance program is dependent on the current or existing communications technology available. Choice is however determined on the relevance to the material in question, the availability of necessary resources, the number of enrolment, and the inevitable cost in production and delivery. In the formative period of correspondence, the postal service was the interactive tool

utilised, which was both effected and affected by the postal service efficiency, the further the distance the longer was the wait. Since then communications technology has vastly improved the media of distance learning, which has moved in tandem with technological progress continuously reducing the "distance" and remoteness associated with distance learning. Synchronous and asynchronous electronic communication allows effective tutor/student and student/student interface, providing the medium for timely feedback and access to information.

Chou *et al* (1996) categorises the various media employed into four generations namely :

- *Print* as the first generation where information was presented mainly in printed matter of text and graphics.

- *Broadcast* being the second generation with the advent of radio and television transmissions, where the information presented was in audio and visual format.

- *Microcomputers* as the third generation broadened the scope of distance learning in utilising Computer Assisted Learning (CAL) through the use of floppy discs and CD-ROMs. This allowed distribution and flexibility of more information than done previously, and learning to be adapted to student's needs with increased interactivity.

- *Computer Networking* as exemplified by the various uses of the World Wide Web (WWW) and the Internet, is the fourth generation allowing greater access to information than previously experienced, enhancing learning capabilities.

The generations of media are still in use today, but there is a greater inclination towards the fourth generation of media. Presently there are courses offered leading to degree certification conducted entirely through the computer networking system or in 'Cyber Space' as is commonly expressed. However students have different

learning styles, and it is not very conducive to facilitate one type of learner. Accordingly it has been realised that a combination of various types, employing the inherent capabilities have proven to be a very effective interactive media tool.

Though the end result of such technology appears simple and 'user-friendly', its design, development, and implementation necessitates specialised training on the part of the developers and the tutors. In this regard it is also necessary to provide the right type and amount of stimulus to maintain student's interest and enthusiasm without devaluing the course. Students must therefore be encouraged to conduct their learning in a similar manner as that of traditional students.

3.3.6 Instructional Support

The objective of a distance learning program is to provide students with the necessary wherewithal to achieve a learning objective on their own accord. It is realistic to assume that many of them, having varying levels of understanding would need to have further clarification in vague issues. It is essential therefore that the opportunity for the tutor interface is made available. The effectiveness of such a system is based on the sophistication of the media employed, and the capability of addressing students' needs and concerns.

The essential ingredient however is the availability and reliability of the technology utilised. In this regard CAL has been very effective in providing this type of support in that it is based on interaction between the learner and the software program. In addition it is vital in the interests of effective learning, that access to required information is available together with the necessary equipment to facilitate this purpose. The DirectED Center in Manitoba, Canada represents the type of support needed in the three distance learning programs currently offered. The package includes adequate hardware (desktop and printer), software, texts, and internet

connection over the duration of the course. Students are also afforded and encouraged to use the electronic facilities in establishing and maintaining communications. This type of support is prevalent in the majority of institutions today, and benefits derived indicate a positive result in enhancing both distance and traditional learning.

On account of the widespread use of electronic technology it is imperative that the monitors and/or coordinators of distance programs be fully conversant with the media employed. On that basis there is the requirement for staff development. The University of South Australia (1995) noted the fact that learner support would also require the collaborative efforts of a team where functions are shared and skills complemented. It was also expressed that the advantages in terms of flexibility should include in any distance initiative the following :

- Training output on networked resources, information, and communication skills in addition to practised teaching styles.

- Practical experience in electronically mediated tutoring and experiential course design.

- Facilitating wide collaboration and sharing of ideas among individuals.

- Development of an electronically mediated professional learning community.

Once staff is facilitated with the technological development as outlined above, learners will be provided with the required quality support necessary for successful completion.

3.3.7 Feedback

Feedback is a key element in the distance learning process. It provides the link for students to determine their rate of progress. Since there is no guarantee that learning packages can provide the necessary answers to all questions, it is acutely necessary that the distance student be able to obtain timely clarification when the need arises. Perraton (1991) endorses this view in stating that feedback is necessary for both the learner to assist in overcoming his learning difficulties, and the teacher in determining the effectiveness of course design and teaching.

The majority of distance centres or institutions have recognised such importance, and have incorporated this facility within their programs. Murdoch University has provided extensive use of telephone services for its distance students. The university has made provision for an 18 hour per day telephone answering service in addition to a dial-access system, which gives information inclusive of course summaries, explanations of specific problem areas, and administrative information. The DirectED Center mainly utilises the electronic media in providing four separate sources of feedback through the facility of the following :

1. *Web server test engine* : where students can complete tests and have them automatically corrected and returned.

2. *Learning advisors* : who maintain frequent contact with students through e-mail and telephone services.

3. *Web sites* : which contain relevant information posted on electronic bulletin boards, and allows students to request information from their advisors or progress reports.

4. *Chat rooms* : on the campus' web server which facilitates student - student interaction as a medium of information exchange.

The extent of the feedback facility provided as described above bears testimony to the importance in which feedback is required in support of distance students. This also assists in alleviating the anxieties experienced by students who are without the benefit of face-to-face contact, and promotes interest and enthusiasm to their objectives.

CHAPTER 4

CURRENT DISTANCE LEARNING METHODS AND TECHNOLOGIES

4.1   Current Distance Learning Methods

Distance learning methods have evolved over time with progressive advances in communication technology. Technological progress is in all instances, ahead of institutional learning methods, and differences become manifested when the need for a particular skill is not readily apparent. Learning institutions are not always able to introduce new technology when it becomes available for a variety of reasons, chief of which, is the cost factor involved in acquisition, and considerations relating to implementation.

Thompson (1987) cites two major characteristics in introducing new technology being the influence of technology in social and economic situations, resulting in the relevance of institution's educational curricula content. The other characteristic is increased understanding in the scope available for more effective communication, and opportunities for a variety and flexibility in learning and teaching methods. An example of such influences in social life is the onset of computer technology, which at one time (and still present in some instances) saw students on leaving a learning institution being confronted by an industry where computer literacy was vital and necessary. On the opposite end learning institutions saw new students having varying levels of computer literacy. In this aspect, it is quite apparent that the

institution is not preparing students adequately for the industry and society, and will have to acknowledge this fact by updating their learning methods and curricula to include computer technology and learning.

Similarly in distance learning the present need is for effective media and communication. However utilising modern technology in these areas necessitates trained personnel in its functional usage, to offset the risk in adapting learning methods to new technology. The media chosen should be determined by its feasibility in relation to costs and convenience in design, production, implementation, distribution, number of students enrolled, and required student needs. Current distance methods practised have been considered effective when various methods are integrated or combined. This enables the package in question to be of synchronal value corresponding to the different learning characteristics of students.

4.2   Correspondence

Correspondence was the initial medium chosen when the concept of distance education and learning was developed. It is mainly print based with communication being primarily by mail, and telephone depending on extent of availability. It is holistic in design as the objective is for the student to learn without the need for interaction with the teacher.

Ideally the course should stimulate and maintain the learning activities and interests in students. The distance teacher is also obliged to a certain extent, to assume the responsibilities of the traditional learning teacher in facilitating the psychological aspect. Motivation must therefore be generated and relationships developed so that the distance teacher can be realistic in making proper assessments, encourage when necessary, and be a counsellor when required. Miers (1987) expressed satisfaction as

a distance tutor in observing, sharing, and encouraging students' learning, in addition to finding out about students and being an integral part of their development.

Though correspondence fulfils (or may fulfil) the convenient aspect of the learner, it is inflexible with a probable focus on teaching and not on learning. It is teacher centred with the developer or tutor more or less being an expert authority with respect to the student. Since the course medium is print based, consideration must be given to the shelf life of textual content involved and the quality of information rendered. Problems occur when information changes rapidly as with technology, and needs to be updated appropriately, eliminating cost effectiveness in mass production when material have to be replaced and redeveloped.

Despite the limitations of printed material, students maintain some aspect of dependency or preference for texts in learning environments. Björgen *et al* (1994) relates in their studies of students involved in projects using the broadcast media of television, radio, and video, that students invariably return to text book learning favouring print material. Possibly, in addition to their assumptions, this results from the psychological effect of progress towards completion, in that the student views printed material to be a complete package having a tangible beginning and end. Consequently if the whole text is understood, then the student can be assured of measurable success. However, combining various media incorporate the various facets of learning characteristics, and to an extent overcome the psychological barriers experienced thereby providing interest and motivation.

4.3   Broadcasting

Broadcasting in a general context means the transmission of data or information to an audience connected to a network. The media of transmission is either through a telecommunications systems, microwave technology, or the use of satellite

communications, which can be live, pre-recorded or delayed. Broadcast media mainly utilises radio and television, but the onset of electronic and computer technology has also facilitated the reception of broadcast transmissions.

The essential feature of broadcast transmissions is the capability of distribution to a large audience over large distances. However transmission being the key, it is relative to the distances involved, and the networking capabilities of the broadcasting network organisation. For relatively short distances as determined by microwave and fibre optics technology terrestrial broadcasting is viable, whilst for distances exceeding 500 miles or if over large bodies of water, satellite technology is preferred.

Though the beneficial aspects of broadcasts have been recognised in facilitating distance learning, there were cost effective limitations, in that broadcast signals were transmitted in analogue format and took up considerable bandwidth. The result of this was that the costs of transmission were very high, and distance learning organisations found it difficult to afford this facility. In addition network organisations placed restrictions in scheduling, and respective time slots may not have been conducive to the distance learner. Likewise the student may not be able to learn at his desired pace, and clarifying vague issues as they arise may not be realistically feasible. However overcoming this problem was effected through taping of the 'lessons' in question, or by having it mailed as a facility by the learning centre.

Generally broadcasts are transmitted uninterrupted, which in one aspect can be considered ideal in that it limits distractions or breaks in concentration. However since the normal attention span in listening is considerably short, the beneficial aspect is somewhat reduced, especially during radio broadcasts, and students would undoubtedly miss important points. It is therefore a valuable option in combining broadcasts with pre-programmed preparation. If it is also possible, to include at some appropriate time a call-in feature where students can ask questions or raise issues, understanding of subject matter will be increased.

Utilising the television medium has the added benefit of audio-visual presentation to hold the viewer's attention and interest throughout its entirety. Television broadcast programs can be developed through pre-recorded material as in video cassettes or discs, for subsequent distribution by mail or the downloading feature in computing technology, in addition to the network broadcast facility. Distance learning institutions in seeking to exploit the benefits of broadcast audio-visual presentations, develop as much as possible, courses around broadcast series and scheduling. Some religious organisations have exploited this medium very effectively to mass audiences worldwide with positive results.

The Open University (OU) has also fully exploited the medium of broadcasting, initially placing distance learning and education in a new dimension. Many distance programs have been conducted in cooperation with the British Broadcasting Corporation (BBC) using both radio and television. As an example of their broadcasting capability to facilitate their objective in being student centred, the 'Learning Zone' was created during the early hours of the morning (0100-0700 hours), which allows educational programs to be taped for subsequent use. This program suits all concerned as it does not interfere with the Network's (BBC) prime time transmission and public viewing.

In relatively early stages of development where this may have been convenient, certain limitations were encountered in combining study material with network programming, as scheduling may not have been ideally convenient for students. A considerable factor was also experienced with production of material. It was realised that developing distance programs required some specialised training, and there was a lack of properly trained staff. The institution therefore in deciding the level of quality output, had to choose between internal or in house production, and an external one conducted in a studio by professionals. The external option has the benefit of technical expertise and equipment for a high quality output, but the

attendant expenditure is considerable and beyond the financial range of many institutions.

In the United States distance learning has been viewed to be essential to its educational objectives, as stated by Krebs (1997)

> "...to create equitable access to instructional resources by overcoming
> geographic, economic, and educational disparities."

Broadcasting was recognised as a prime medium in effecting this type of learning. As a result, broadcast networks were encouraged to assist in expediting broadcast material for distance learning purposes. The development of computer technology also enabled higher quality programs to be produced, as teachers became more familiar with using the technology and received the required training. Distance learning programs were increasingly developed with focus placed on teachers in increasing and enhancing their skills. Krebs (1997) mentioned that 25 % of distance programs focused on teacher and staff training, with evaluative research showing that educators became more confident in presenting and creating learning materials. It also revealed that teachers' attitudes changed with respect to teaching. They were more willing to experiment with new practices, developed new relationships, and adopted a more learner-centred approach.

Though the use of satellite broadcasting was initiated in the United States in the mid-1960s to facilitate distance learning, the use of this medium took on a new dimension in the 1980s. The development of digital signal compression techniques and the ISDN (Integrated Services Digital Network) realised substantial reductions in the costs of satellite broadcasts transmissions, allowing many distance learning institutions to afford the facility. This also allowed teleconferencing and videoconferencing to be utilised substantially in distance programs providing a large measure of interaction and interactivity for the students between teachers, other students, and the programs. The inception of the Internet and interactive multimedia

complemented the broadcast feature and increased the quality of learning and the service provided.

Today the whole aspect of broadcast has assumed different levels, and through the medium of satellite technology, institutions and network organisations can transmit data through multicasting and webcasting features. Learning programs, lectures, seminars, video and audio presentations, and other relevant information can be downloaded on demand so teaching schedules can be conveniently formulated. Students are therefore able to structure their own learning and gain the benefits of broadcasting services.

4.4   Computer Based Training

This learning method employs the use of computer technology and its interactive capabilities, to embody the concept of distance learning with traditional learning styles. The widespread availability and affordability of computers with its corresponding reductions in size and costs, placed distance learning in a new dimension. Stonier (1987) described computer technology as '...the first genuine revolution in over a century...' The introduction of the micro computer in the 1970s as a learning tool, influenced the technology and learning facility which increased tremendously and developed at an alarming rate, especially within the last ten years.

Initially focus was placed on skill based applications, where standard 'drill and practice' programs were utilised. According to Anderson (1982), Texaco in initiating its Texaco Onboard Program of Computer-Assisted Training (TOPCAT), saw the development of the then powerful micro computer hardware and software important considerations to gain a competitive edge on the market. In achieving this objective, they provided their crews with the medium of improving their expertise through the use of computer based training programs, augmented by the availability of reliable

electronic communications. Consequently computer based training and computer assisted learning programs were developed to supplement current learning methods.

The technology embodying effective utilisation of micro computers, centred on the capacity to store and retrieve large amounts of data. This capability was initially provided by the use of computer diskettes or 'floppy disks', which enabled training programs to be stored and easily distributed. Data storage (though limited in comparison with today's standard) made it more feasible for text to be required on demand, and presented in a user friendly and learning enhanced format.

Laser technology led to the development of the Compact Diskette (CD), increasing the data storage of the diskette, with one CD having an equivalent storage capacity of 700 computer diskettes. This increased storage capacity allowed interactive capability, subsequently enhanced with multimedia application, which optimised learning styles in providing the essential characteristics of interest and motivation, in addition to ensuring learning objectives are achieved.

The growing availability of Computer Based Training (CBT) and Computer Assisted Learning (CAL) software packages in a variety of learning methods, enhanced the capability for the student to fully utilise the concept of distance learning. It enabled the individual to tailor his learning needs, and to learn at his convenience and learning rate. These learning modes particularly favoured skills based applications within the industry, in being cost effective and reducing the time factor in acquiring necessary expertise.

The skills based applications were further developed to provide simulated operational situations with operational equipment. Technological progress further expanded this desktop CBT training to stimulate a heightened sense of reality in creating a virtual or simulated environment. This was recognised as a cost effective medium in allowing the individual to develop operational skills and expertise, without the inherent expense of damage to operational equipment. An added benefit was derived in creating the correct attitude and alertness in the interests of safety within the

operational environment. The reliability of such simulator training has been recognised in both the maritime and aviation industries where such training has been made mandatory for operators prior to certification.

Though the simulated environment proved essential for life threatening situations, it did not fulfil the purpose of distance learning. Consequently simulator programs as shown overleaf in Fig 2, were developed in other areas of required industrial expertise, which were configured for the micro or personal desktop computer. Although there have been varying comments regarding the level of realism imposed on the learner employing such learning features, it undoubtedly aids in the understanding and familiarisation of the features in question.

Computers are increasingly becoming more compact and powerful, being able to handle numerous applications with the increased storage capacity. An example of this is the current laptops and the smaller notebooks (did someone say palmtops also?) widely available and affordable, which have similar attributes and greater storage capacity than larger desktop computers. The student utilising this technology is no longer restricted to a particular desktop location, but can now operate anywhere at any given time in a true distance learning mode.

4.5   Network Conferencing in Distance Learning

Network conferencing is basically a two way interaction occurring in a point to point, or point to multi point format between groups of people. Similar in concept though not design, of broadcasting systems, this learning mode covers large distances with

the potential to reach mass audiences. In facilitating this objective, network conferencing is achieved mainly through the following:

Fig. 2   PC Maritime Simulator Program
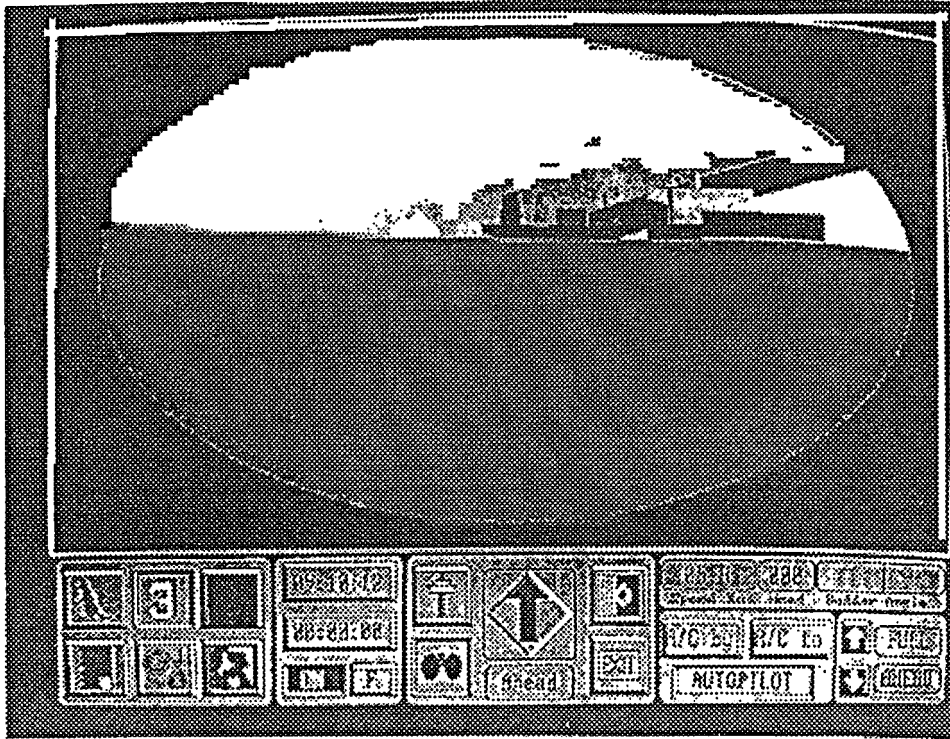
Enhanced 3-dimensional graphics of PC Maritime Officer Of
the Watch Rules of the Road Simulator Program

Source: Sandberg, G. & Stewart, R. (1996).

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- Teleconferencing which is a conference held between two or more parties connected via a telephone or computer network. Parties are able to speak and to hear each other using microphones and speakers, or facilitate this type of communication in a telephone 'party line'. In using the computer network, there is a similar voice capability as in videoconferencing, but parties can simultaneously utilise the computer applications of multimedia interactivity in downloading, storing, forwarding, or accessing information.

- Videoconferencing which is a conference held between two or more persons at different sites using computer networks as in teleconferencing, having the capability to transmit video imagery, and audio. Parties in communicating are able to see and speak to each other through cameras or webcams mounted on the respective terminals, and with the use of microphones and speakers. Parties are therefore able to view what ever is presented in front of the cameras.

- Virtual communities which comprises of people gathering together (as in a class), in a virtual environment communicating electronically via the internet using computing technology either in an asynchronous or synchronous mode. Although electronic text is largely used, voice transmission capabilities as in teleconferencing via the same medium are becoming quite common. There is evidence where distance learning courses are conducted entirely in this manner.

- Telematics which is basically the integration of the various aspects of computer communication together with the use of telecommunication systems. In this way parties in conferencing would be able to communicate in an audio-visual setting, whilst being simultaneously capable of using other computer multimedia applications.

Distance learning through computer networking has further improved the learning facility. Based on reports of surveys conducted, the general consensus indicated that computer generated network conferencing stimulated interest, enthusiasm, communication, interaction, motivation, and understanding. It was previously (and

still maintained though to a lesser extent) considered by those sceptical in embracing the distance learning concept, that a major flaw identified was the lack of teacher-student interface. Though this is not primarily essential in the distance concept, it has been held to be of vital importance in learning strategies. The computer with increasing compactness, memory storage, and powerful applications, has broadened the scope (and has overcome the perceived flaw) in its variety of uses facilitating greater flexibility in learning. Its widespread availability has made it more of a necessity than a luxury, becoming as commonplace as the telephone and more looked upon as a tool.

In recognising the importance of these technologies in distance learning, Dumont (1996) observed that there was more reliance on the interactive methods of telephone, video, and computer conferencing. The National Center of Education Statistics (NCES) (1998) in its survey report suggested a growing preference for interactive media, based on the fact that there was a 25% increase in the number of distance learning institutions utilising the technologies in its various forms.

The benefits from the use of interactive and conferencing technologies can only be gained in using suitable equipment and having access to the Internet. The necessary equipment would consist of computer hardware as stipulated in Table 1 below, categorised as for educational purposes, and compatible software. However should the learning medium employed be more sophisticated, then proportionally more sophisticated equipment having larger storage capacities and more powerful programming would be required. This would also increase the cost considerably.

The development of computer networking through the technology of teleconferencing, videoconferencing, and the Internet, have more or less eliminated the teacher-student interface concerns. The availability of the Internet, and use of MMX and multimedia technology have tremendously enhanced and facilitated the use of network conferencing capabilities. This has served to lessen the remoteness

and isolation usually experienced by distance students as expressed by Jorn *et al* (1996) and Dumont (1996).

Table 1   Network Conferencing Computer Hardware

Hardware	Minimum	Standard	High End
Processor	Intel P 133Mhz MMX Tech.	Intel P 166Mhz MMX Tech.	Intel Pentium II 233Mhz +. MMX
Memory	16Mb RAM	32Mb RAM	32Mb -64Mb RAM
Hard Drive	1.5Gb	2.0Gb	4.3Gb +
Floppy Drive	3.5" Standard	3.5" Standard	3.5" Standard
CD-ROM	8x Speed	12x Speed	32x Speed
Sound Card	16 bit Stereo	32bit Stereo	32 bit Stereo
Video Adapter	1Mb - 2Mb VRAM	2Mb - 3Mb VRAM	4Mb - 8Mb VRAM
Videoconferencing		Video camera/Webcam	Video camera/Webcam
Monitor	15" SVGA / 28mm dot pitch	15"-17" SVGA / 24mm dot pitch	21" SVGA / .22mm dot pitch
Modem	28.8K bps	33.6K bps	56Kbps.

4.6   Potential of Distance Learning Technology

The technologies associated with distance learning are becoming more integrated with less defined lines. The technological progress in telecommunications has experienced a phenomenal growth within the last ten years, and outlined a new era in distance learning as well as a variety of other communication related social amenities. The commercial competitiveness of the various facets of telecommunication technology, has greatly influenced the response to the

communication demands of society. The social assurances that affect acceptance include increased transmission data speed, integrity of data transmission, and data security with cost effectiveness of the service an over riding factor.

4.6.1 Satellite Communications

Satellite communications since its initial development has become an integral component in facilitating distance learning. The attractiveness of this medium is the speed of transmission with a reliability factor of 99%, and its capability of communicating to remote areas of the world. Another attraction is the capacity for receiving and transmitting large volumes of data. The fairly recent innovation of digital compression has made satellite communications more available and increasingly attractive to a wider society in terms of costs and service, which have been substantially reduced by as much as 80%. Careless (1997) cites the example given by Ali Mohadjer of Hughes Network Systems (HNS) of The Ford Motor Company, in that their network "Fordstar" links thousand of dealers to their continuing education programs. The fact that digital compression reduced satellite costs substantially, has enabled them to fully exploit the use of satellite technology for distance education and internal communications.

The main characteristic of digital compression is its ability to reduce data content by removing redundant and irrelevant data through algorithmic processing. This capability reduces data content to as much as eight times its original size, which allows multiple digital feeds or signals into a space which held a single analogue channel. The increase in the data capacity and speed of information provides the capability of large volumes of data including audio and video to be transmitted in real time.

Since satellites cover large areas of the earth's surface, they provide a broadcast capability that fulfils the requirements for distance learning to a large extent. The potential for satellite utilisation is further augmented by the growing developmental trend to provide internet services not only for networks, but also to the consumer. A computer unit having direct satellite connection through a mounted 26" dish, is presently able to bypass the terrestrial communication system and be connected to the Internet with the potential of receiving data at speeds up to and in excess of 400 kbps.

Future technology predicts asymmetrical, interactive communications for the consumer having a terminal which can accommodate a data rate of 6 Mbps, and transmit at a data rate of 384kbps. With this type of speed the contents of a CD-ROM can be downloaded in less that three minutes. For internet backbone networks the data rates can be as high as 155 Mbps, though the present service provides between 30 and 45 Mbps.

4.6.2   Internet and Multimedia Technology

The development of the Internet experienced phenomenal growth since being available for commercial purposes in 1990. Its exponential growth has made it part of the social framework in that it is used and accessed on a continuous world wide basis by millions of users. Sterling (1998) states that the Internet was used primarily for mail, discussion groups, long distance communication, and file transfers. It has since been additionally regarded as a primary source of information for all purposes, and is used extensively for this purpose.

The potential for this resource provides easy and available access to information for both students and teachers in a manner which fulfils distance learning objectives. The introduction of the World Wide Web (WWW) enabled the Internet user to

source internet information in a user friendly, logical manner. In this way the user has control over the type and extent of information desired and being able to download such information at any time and from any place.

Multimedia (MMX) technology was very instrumental in placing the whole aspect of learning on a higher level, by enabling the student the capability to actively interact with program learning. The whole concept of multimedia is integrating audio, video, text, graphics, and animation through the use of a computer system. This is dependent on the amount of storage space available, and the compatible software.

The technology facilitates learners with a high level of interactivity in learning programs to primarily enhance learning skills and knowledge. Students are therefore able to individualised their learning with focus on different points of interest within a learning program. They are therefore able to study at a comfortable learning pace incorporating the basic learning characteristic of seeing, hearing, and doing. This favours understanding, encourages continued participation together with increased interest and motivation. With the access to the Internet there is also the capability of downloading, storing, and retrieving information, which can be used conveniently.

Tutors in using the functions of the Internet and MMX technologies are able to distribute information to their students individually or collectively, correct and return assignments timely, be able to establish relationships and give feedback in a timely manner. Students on the other hand can interact with each other and with the tutor through the various means within a virtual environment.

The idea of establishing a virtual learning classroom where teaching and learning are both conducted electronically is a challenging task for distance learning advocators, that is not far fetched or impossible. Another development in synchronisation with the virtual classroom is the electronic library, where students can download whatever material they need. This is beneficial to libraries and students in that there is no strain incurred with demands for certain publications.

The main complaint of users of the Internet is the speed of access being limited to the capacity of the modem connection. Developments in satellite technology however have the capability of eliminating that problem with direct transmission through single unit satellite dishes increasing the data rate as stated above. In addition the support of federal funding in the United States is to develop the backbone network to increase the speed and quantity of data transmission, which in turn will address the complaint of speed.

4.6.3   Computing Technology

The computer has evolved over the past twenty years into a very powerful tool being able to perform a variety of functions. Technological progress has shown an inversely proportional factor between size and power. The desktop, which was previously considered revolutionary, has more or less been reduced to a palmtop fitting in the palm of one's hand, having as much or equivalent functional use.

The primary factor of technological progress is the increased level and reliability of communication. It has become possible for students to work exclusively at their location, with the various multimedia interactive functions as the basis of support. The integration of the various computer based systems with the advent of telematics, would undoubtedly encourage distance learning at a standard higher than that offered by traditional higher education institutions.

Regarding the enhancement of skills, this is evidenced by the progression of simulation technology, which has produced favourable outcomes with training conducted in a virtual environment simulating realistic situations. For seafarers one can envisage in the not too distant future an electronic ship where all shipboard functions can be simulated, with training conducted for crews prior to joining their respective vessels.

The current development of the office at sea or floating office concept provides an ideal opportunity wherein distance learning can be effectively incorporated. This concept no longer regards the ship as an isolated or independent entity. Growing appreciation for satellite communications, have encouraged the use of information technology (IT) onboard ships, where operational strategies include the ship in routine management functions. Favre (1996) emphasises the fact that the 'Floating Office' concept as shown in Fig 3 overleaf is no longer an option, but destined to become a necessary fact of shipping life. Vessels being equipped with onboard computer and communications networks, are connected to shore based corporate offices, with access to onboard information.

Muirhead (1998 a) views this development to offer limitless opportunities where distance learning can be effectively utilised. In this way training programs stored within electronic libraries (like those currently developed by Seagull and Videotel) in a server ashore can be downloaded at any time for ongoing training when necessary. Shipping companies can easily provide onboard training using this facility. They would also be in a better position to conduct such training, monitor progress of respective crews, and maintain efficient record keeping, whereby necessary information regarding certification and competence (as required by STCW 95) can be acquired on demand.

SATELLITE LINK

SHIP'S
LAN SYSTEM

ORGANISATIONAL
ESTABLISHMENT -
WAN SYSTEM
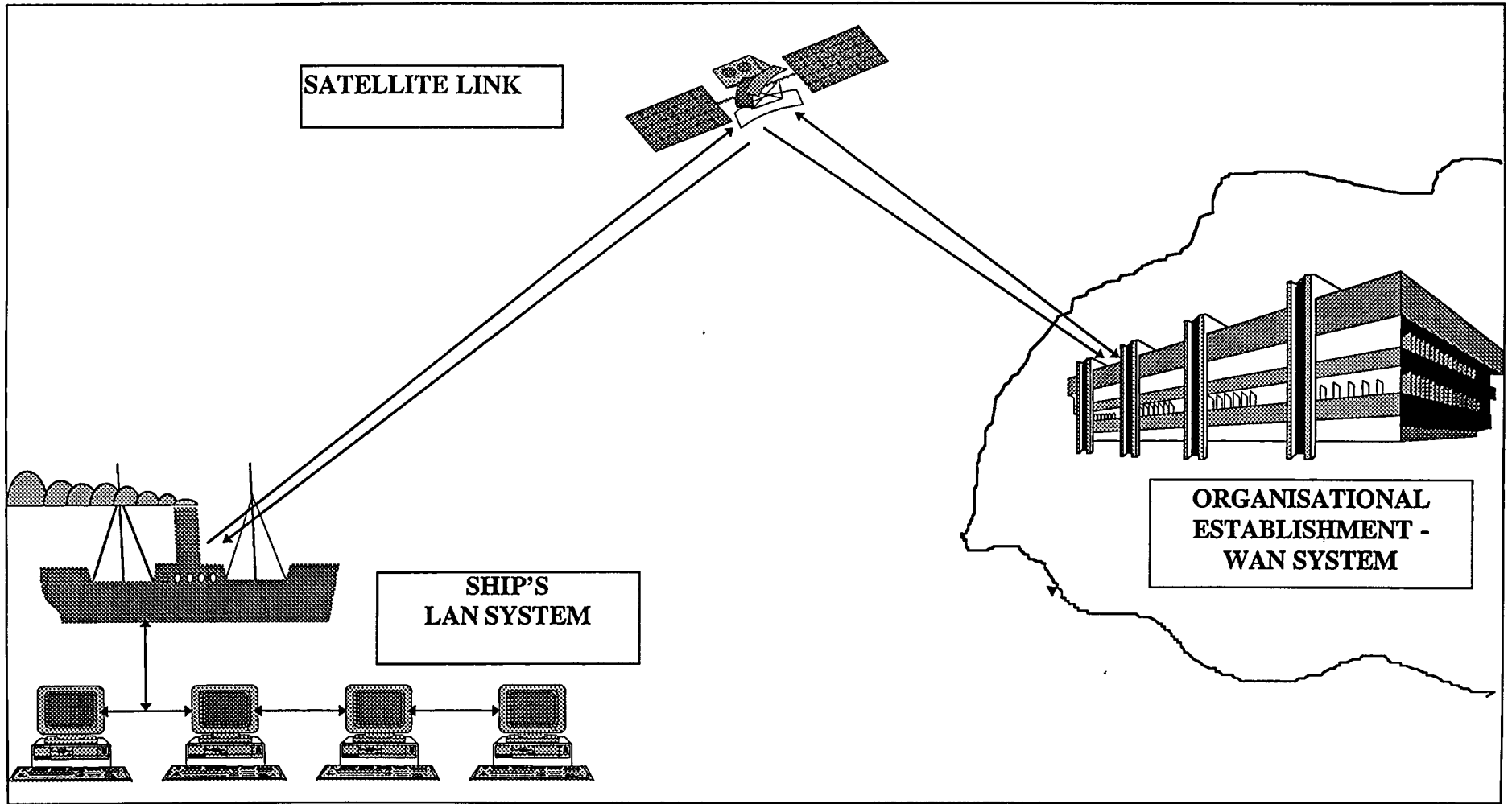
FIG. 3   FLOATING OFFICE CONCEPT

CHAPTER 5

DEVELOPMENT, DESIGN, AND DELIVERY OF DISTANCE LEARNING MATERIAL

5.1   Concepts of Material Production

The production of distance learning material is based on a different concept than that of traditional learning. Adopting a student-centred approach in having to impart knowledge at a distance, various learning styles are applied in fulfilling the educational objectives of the cognitive, affective, and psychomotor domains. This approach must also cater for the different learning characteristics of distance students as expressed by Sparkes (1998), with the intention of stimulating interest and other psychological benefits. Focus is placed on the aspect of learning rather than teaching, with the intended outcomes being achieved.

The essence of distance material production includes format presentation, content, and the language used. The presentation should be clear and concise without the complexity and intellectualised manner of traditional lecturing. It should also be designed to assist the student in providing the necessary information in perceived difficult areas. This could be akin to a teacher's lesson preparation in previously seeking the answers to all possible questions that may be asked by the students, or in the more current usage of the Internet's FAQs (Frequently Asked Questions).

Material is presented in print, non-print formats, or in combination. It has been found especially with the advancement of computing and telecommunications technology, that combinations are quite effective. The fact that the basic concept lies in facilitating individualised learning at a distance, the material presented must fulfil the requirements for understanding with on demand or 'just-in-time' information to enhance clarity.

The language used is a crucial factor with consideration given to foreign students, so that the use of slang or colloquial expressions, for example, should be avoided. However the author found in reviewing samples of distance learning material, that the use of current and popularly used words and phrases tends to make the topic content engaging and interesting. This augmented with a friendly, personal, individualised, conversational style of approach with the use of easily imagined analogies, made for easy and rapid understanding. In determining the concept however, certain factors as identified by Parer *et al* (1990) need to be considered for efficient and effective staff development.

5.1.1   Recognising the Importance of Distance Learning

In many instances distance material is developed and designed within an institution where the inherent factors of acceptance are frequently discussed. Many institutions do not place distance education on an equivalent level as that of other curricula, and in most instances, it is looked upon as added on without any real measure of success. Therefore in order to have a high quality output, the importance of distance learning must be recognised and accepted as a method of learning for students unable to access traditional learning.

Providing the importance is recognised, it is necessary that support is generated through the commitment of adequate resources pertaining to finances, staff expertise

in training and acquisition, equipment, and administrative facilities. It helps tremendously if the institution and faculty is made positively aware of the concept, and 'buys in' to its development. This is more prevalent today since the quality expected of distance learning material with its availing technologies is not possible to develop when merely regarded as an extension of a lecturer's teaching responsibilities. The quality and technology more or less demand specialists' functions, so it is no longer a one person program development.

The argument in recognising the importance of distance education, correlates to the results of a needs analysis, where it can be determined whether there is a market available for the course designed, and its relevance to current industrial trends. It will also be necessary to examine the resources available with regards to the chosen medium. Other factors to be considered should include the following:

- *Policy Guidelines* to be written and established so that staff would be clear in the expectations of institutional objectives and requirements. Lack of such guidelines promotes a feeling of apathy and subsequent lack of interest, which would not fulfil the objectives of material production. The manner in which these guidelines are communicated could also be a delimiting factor, which could generate negative responses from staff. A study conducted by Parer *et al* (1990) indicated that in some institutional policy guidelines were only expressed during the selection interview or upon hiring. This was not particularly favoured by staff concerned, who in being given word by mouth had nothing tangible in which to refer. A preference proffered by staff, was in favour of written guidelines.

- *Selection of Expertise* is essential to the success of any distance material design and development. The need for staff with professionalism in addition to other compatible intrinsic qualities is required. Subject matter expertise should encompass the whole developmental course design process of authoring, validating, developing, graphic designing, production and media specialisation. Since the level of staff involvement and support is crucial the selective preference

is towards personnel showing a personal interest in the distance concept. Personnel identified should be supportive, appreciative, and sensitive, and willing to respond to the demands of distance learning. This does not only apply to the development and production, but also in implementing and facilitating the process within the bounds of their expertise.

- *Professional Staff Development* is also essential for the success of material development. Generally lecturers and staff in getting involved with material production, are not familiar with the process and/or the technology utilised. It is necessary that they be suitably trained and have a basic and general understanding of what is required. Subsequent to initial training, progressive professional development would ensure continued success and improvement in producing material, not to mention increased confidence and the sense of achievement as motivating success factors.

- *Integrating Distance Learning* is a factor in getting staff onboard with the distance teaching and learning concepts, especially when part of an institution. In facilitating and implementing the distance concept, the expertise is drawn from those accustomed to traditional learning and their co-operation is a major requirement. Accordingly their approach, attitudes, and responses to new learning and requirements can be determinants towards successful outcomes. Personal concerns together with 'hidden agendas' must be addressed. Generally concerns to be considered with regards to the staff, would include the following:

    1. Having to go through the process of re-learning again and being a student.

    2. The 'fear' of not understanding the technology and loss of confidence.

    3. The value of their worth may be ill placed and they may not be willing to accept advice and learning, after being accorded experts in their field for lengthy periods of time.

4. The time afforded to adopt new trends may not be sufficient.

5. The manner in which they would have to deal with the perceived additional work load, and institutional demands with regards to objectives.

6. Remuneration as a factor for incentives.

7. Insecurity with regards to their usefulness and probable change in status and respect.

8. Strong beliefs in traditional learning concepts, occasioning in the application of traditional strategies into the production of distance learning material.

9. Inability to work in teams with non-academic personnel.

10. Level of priority given to the development of producing distance learning material.

The above though not exhaustive, are issues to be resolved together with individual intricacies of respective institutions. It is quite possible that these factors can be resolved through preferably written policy guidelines, and proper management where a priority level is recognised. In the final analysis proper and effective orientation techniques and programs are necessary requirements for designing suitable and acceptable programs.

5.2   Design Concepts

Despite the fact that distance learning is to some extent resisted and de-emphasised, its growing social acceptance and status has more and more been recognised as a legitimate form of education. However designing distance learning material has in recent years become more of a specialised function, with design and development

being separated. The expenditure in the initial design and production is considerable, so institutions must be committed in achieving stated objectives. Therefore in being cost effective and affordable, issues to be addressed should include the following:

- Need for the subject whether it is required by industry and potential students.

- If a similar subject is offered by another or other institutions so market share is considerably reduced.

- Subject content and its relation to other subjects.

- Prerequisite knowledge to determine level of individualised instruction, and type of students targeted.

- The media technology chosen within budgetary limitations and its cost effectiveness, efficiency, and reliability.

- Quality of material produced with regards to specific standards, production approaches and methods, and ongoing evaluation.

Having taken the above issues into consideration, an outline plan and interactive curriculum model of the subject is established. A concept map or diagrammatic flowchart is developed showing syllabus and training content, a learning sequence, study guide, material information resources, assessment, and evaluation. The interactiveness of the curriculum model should be flexible and preferably non-linear, with pathways or links to relevant and more detailed information to accommodate different learning levels and characteristics. This facility is further augmented by the extent, level, and quality of student support, enhanced by information accessibility, multimedia, and telecommunications technology.

5.2.1 Developmental Process

The developmental process involves professional personnel working together in subject teams. Teams consist of a varied number of academic and non-academic personnel having specialist functions. The format of the process is basically done in two parts, (1) the written plan, where each individual step is outlined on paper, and (2) transference of the written plan to the media chosen i.e. print or non-print.

Vanstone (1997 b) describes these processes in the following manner:

Written Plan

1. Drafting of the written plan or 'storyboard' specifying a list of events outlining where information is shown, the manner in which it is presented, where user involvement is required, and insertions of text or other accompanying aids. During this stage research is required to ensure validity of information for the subject content, user support in identified subjects, and organisation of study material.

2. The production order where the learning sequence is considered based on the training requirement. This is likened to determining prerequisite knowledge, where the student is required to have a level of knowledge learnt at a previous stage, before advancing to another.

3. Designing the written plan where the logical presentation of the information is developed. At this stage (as in all stages) emphasis is placed on the end user, so the factors governing ease of reading, clarity of information, language usage, and learning styles or methods are taken into consideration. Also included in the design are remedial loops at each significant stage to cater for the individual's learning pace and characteristics, where the student can obtain the necessary information to increase understanding.

4. Development of the 'storyboard' or plan primarily features the assembling of the information in a coherent and effective manner. Relevant information is grouped together within its respective subjects, allowing a gradual and steady assimilation of the subject matter, with speed of progress dictated by the user.

5. Developing user participation is introduced through specific related activities and interactions to emphasise and strengthen learning points to ensure particular training or learning objectives are achieved. Determining related activities and interactions takes substantial planning as these are supposed to enhance the learning objective. If activities are in the main too basic, then student attention and interest will wane resulting in boredom. The same effect will be created if activities are too complex.

6. Developing suitable assessment questions to ensure the student fully understands the subject or module. This assessment method can be continuous or upon completion, but should preferably be short and concise with answers provided as a form of feedback or progressive evaluation. Through this assessment, the student should be able to accurately gauge the level of his/her achievement and progress. In using computer based multimedia systems, this is easily effected as such feedback, often in the instance of correction, is immediately obtainable in a variety of combinations.

7. Assessing the completed written plan or storyboard is the final stage of this format, where it is accepted by other responsible persons for content, style, and information accuracy. When it is determined that the training objective has been satisfactorily met in terms of the information being sufficient, valid, authentic, current, and relevant, then one proceeds to the transference process.

Transference

After the written process has been completed and vetted, the information is then transferred to the medium chosen and packaged. Regarding print this takes the form

of text on its own, with or without graphics, and possibly supplemented by audio tapes, videos, and computer discs. In many instances such texts are incorporated with lesson broadcasts by radio and television, which have been successfully exploited by institutions like the Open University.

In non-print applications as in audio and video cassettes, the use and modulation of voice and sound effects are prime criteria for audio. The presenter has to project a vibrant personality and enthusiasm in the subject matter through voice, to evoke interest and motivation in his/her listeners. This has to be complemented by suitable pitch and pace, punctuated by planned pauses so that the listeners have enough time to assimilate the information, and are able to fully understand what is being said.

The use of video productions has been recognised as being very effective, but production can be costly depending on the desired quality. Though the basis of production is facilitated by any video camera and inclusive tape recorder, using in-house production generally results in amateurish attempts. This undoubtedly is related to the sophistication of the equipment, and the specialised knowledge of the producer, who would be able to enhance the outcome for the desired effect.

Depending on location (near a source of noise as in an urban area) could include the taping of background noise which can be very distracting upon listening. External productions as in a network studio would result in a professional output, with sophisticated, complex equipment having a variety of editing features. The presenter however could be a mitigating factor if not accustomed to facing a camera and making a presentation, using facial and non-verbal cues to a desired outcome.

Computerised technology provides a more flexible and user friendly outcome through the various applications of computer software. The multimedia application greatly reduces the limitations experienced in other design features by incorporating the characteristics of all media mechanisms and more i.e. text, audio, video, graphics, animation (moving pictures) and photographs. The availability of editing software in

computer applications, easily enables the deletion of unwanted background noise, or insertion of desired sound effects, to a high quality standard.

The development of a distance program using computerised technology should be non-linear in design with access to on demand relevant screen information through the use of 'icons' or pictorial buttons with a fair amount of immediacy. These buttons have specific functions associated with required computer events on a particular screen. The use of CD-ROM and associated components with its large data storage capability, allow these software applications to function with a high degree of integrity and reliability. It also facilitates the creation of databases where software programs of training packages can be stored and be available at anytime.

5.2.2 Subject Teams

Subject teams consist of personnel complementing each other with the different component skills. They may and advisably, comprise persons having academic and technical expertise necessary for a high quality material product. It is essential that these persons work closely together given the adequate resources, time, and administrative support. A subject team is usually composed of the following specialist functions:

Author/Lecturer responsible for the subject content, drafting, learning experiences, and material. Having the academic expertise, this person usually is the team leader co-ordinating all aspects of the design process.

Content Validator/Subject Specialist responsible for checking the authenticity of the content and sequence of study material. This person also ensures the content is current, valid, relevant and sufficient.

Course Development Officer is responsible for the presentation of the information with respect to user participation activities, language, style, editing, and proofing. This also includes the visual appearance of the complete package. In this aspect subject matter expertise, though not entirely essential, is necessary to check for consistency and relevance to the expected outcome. The duties may also extend to the structuring of study materials, page layout in association with production, vetting of study material including copyright requirements prior to processing, and may be instrumental in the development of non-print material, and assist in conducting workshops and seminars for staff involved in distance learning.

Graphic Designer/Artist looks at the typographical format and ergonomic value with regards to style, graphic designs, and other graphic features.

Production Personnel processes documents, develop pagination and graphics. They also look at the order of presentation, and its suitability to the user.

Media Specialist is primarily involved in the last stage before packaging in the transference process. The duties relate to the preparation of audio visual material and computer programming software in putting together the completed package.

5.3   Delivery Concepts

The effectiveness and efficiency of any distance learning program is in its delivery, and the level of motivation and enthusiasm generated by its interactiveness with the distance student. This is an essential consideration as it determines how the student will respond to and assimilate the information presented. In a holistic sense it guides the student through a learning sequence enabling flexibility and progress at desired learning rates.

A student is also able to gauge progress through program assessments, and feedback responses at planned scheduled stages within the design, where participation activities and assessment questions are inserted. The method of delivery should enable the student to overcome certain psychological barriers, which influence motivation and interest. These barriers can however be resolved to a large extent by the students being able to communicate with their tutors in addressing their concerns and learning difficulties. Accordingly distance learning packages revolve around the delivery medium chosen.

The delivery medium also affords the level of access and guidance to resource material in enhancing the learning process, and the feeling of belonging in subsequent interaction with tutors and other students. However this is based on the technological system used, with its variety of combinations. Computer generated delivery, though in the final instance has proven to be very cost effective for all concerned, is costly and time consuming to design and develop.

However with regards to the delivery of distance material, the method chosen is directly related to the design and development of the material, which is consequently influenced by the level of commitment and priority level afforded by the institution as previously discussed. The development of print based material as in Task And Guidance Studies (TAGS) shown as an example in Fig. 4 overleaf, would in the final analysis be dependent on mail delivery or 'snail mail' (being the description used in electronic jargon), while non-print as in being electronically designed would utilise a virtual environment with the use of multimedia technology. The design concept would also be different, as members of the subject team would have a different range of skills as in the production of texts for print based applications, and the production of computerised software programs.

Fig.4 **Task And Guidance Study Program**

The remainder of the examples in this chapter deal with an important area of content; the teaching of academic skills and particularly problem solving.

In Example 5-17 the steps involved in a standard type of calculation are listed, then the student is immediately asked to try a calculation to practise the procedure.

EXAMPLE 5-17

Note the steps in these calculations:

number of moles

1. Calculate the number of moles of the substance whose amount is known.

mole ratio

2. From the equation calculate the mole ratio of the product of interest to the reactant of interest. (Products are the chemicals on the right hand side of the equation, reactants are on the left hand side.)

3. Hence determine the number of moles of the product whose weight is not known.

4. Determine the weight of the product (i.e. known weight → known number of moles → unknown number of moles (via equation) → unknown weight).

QUESTION 2-1

Methane (molecular formula CH_4 is the major component of natural gas. Methane is a very useful fuel since it burns completely in the oxygen (O), in air to give carbon dioxide (CO), and water (H_2O). The balanced equation is:

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$
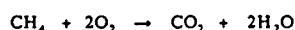
(a) How many mole of O_2 is required to completely burn 0.30 mole of methane?

(b) How many mole of CO_2 will be produced when 0.30 mole of methane is burned?

(c) What is the maximum number of mole of methane which can be completely burned in 0.50 mole of O_2? How many mole of CO_2 will be produced in the process?

If a procedure is to be repeated a number of times with different data or in different situations, it is worth considering the construction of diagrammatic ways of showing that procedure. Example 5-18 shows an algorithm for constructing a synthetic tree.

Notice in this example how the student is immediately led through an example of how to use the algorithm.

Source : Capricornia Institute (1998)

5.3.1 Communications in Delivery Material

A perceived flaw recognised by traditional academia in the distance learning concept, is the lack of the didactic benefits associated with traditional learning between the tutor and student. In minimising such effects, a simulated didactic exchange must be fostered within the material design. The tutor/presenter must develop a personal relationship with the student where personality and enthusiasm among other emotions are transmitted in the language and presentation of the material. It is therefore necessary that a positive response is evoked, where the student is made to feel comfortable and assured. How this is effected could bear a great deal of significance in the acceptance of the program.

A successful mode of delivery communication is based on the language style of the content. Utilising a trendy, friendly, conversational style, where the effect simulates conversation being conducted, and the student is able to assimilate the information and make inquiries (through access to information at difficult learning points), obtaining a response in a similar manner. The similarity of this in a traditional environment is in asking the lecturer/teacher questions in a classroom. In the author's perception the distance student in this aspect, feels more at ease in asking questions than in a classroom with the attendant inhibitions e.g. in feeling foolish, when a feeling of fear is provoked in asking 'stupid' questions.

The trendy use of language generates greater understanding as the student can relate much faster to the teacher. This incorporates the use of common or daily analogies, which the student can easily visualise. The Internet is a prime example where this type of language mode is extensively utilised, resulting in easy reading and understanding through vivid mental imagery being evoked. In contrast is previous language styles, where the language trend used was of a scholastic nature, with the information buried in complex sentence structures having difficult words to pronounce and understand. Perhaps it is the required use of simple, easy to

understand language that academic critics find difficult to accept and appreciate as suggested by Grey (1998).

5.3.2 Teleconferencing Delivery

Teleconferencing delivery of material complements texts and or activities with opportunities to interact at periodic intervals. Students in having study guidelines are given schedules when teleconferences are conducted. Such conferences are conducted at difficult and particular learning points in the program, augmented with tutorial support at the respective learning centres. Students have the opportunity in seeking clarification and further information at that point, where they are able to interact with other students in student-student exchanges, which have been recognised to be of beneficial value in enhancing learning in a traditional environment. Students must however be prepared for the topic discussion, and must have reached a certain point in the program to gain substantial benefits.

Based on the fact that a teleconference is conducted among large numbers of students within the same distance program at various learning centres, there is a possibility that it may result in the primary mode of communication utilised. Since conferences are held at difficult learning points, the student is obligated to learn at the specified pace of the material presented, though the opportunity to vary the learning pace is provided.

This takes the format of an extended classroom environment with learning and interaction primarily through an audio medium with tutorial support, where similar classroom inhibitions as previously mentioned could apply. A successful example of this learning mode is evidenced in Australia's remote areas, where the University of the Air conducts regular distance education classes with the use of radiophones. Students relate and interact with each other and the teacher, relatively creating a

similar learning environment found in a traditional classroom. Learning difficulties may however possibly arise due to the large number of students involved, where a student may not be afforded the opportunity to clarify vague issues due to time constraints or in asking timely questions. It is therefore vital that institutions in using this delivery medium within their material design, provide additional student support.

5.3.3   Electronic Delivery of Material

The rapid advances and availability of computer technology has generated a comparable burst of growth in distance learning programs using this medium. The scope within which this medium is viable has made its applications very popular with remarkable results. The multimedia technology has placed this learning mechanism in a new dimension, incorporating the intended spirit and objectives of the concept of distance learning as previously described. To date there are many institutions offering distance programs in a totally virtual environment having successful intended outcomes. This completely eliminates the use of print in any format, as learning needs are satisfied from introduction to evaluation, including the capability of the comparative case in updating the content with subsequent notification.

The avid use of the convenience and facilities of the Internet (Net) and electronic mail (email), is incorporated within the entire process of material design. Its flexibility can also facilitate the range of learning methods employed in varying combinations. Learning institutions have been tardy in recognising this resource, and are now looking to develop and utilise the technology whilst simultaneously trying to become familiar with it through necessary training.

The design of the program is based on subjects having screen links showing additional and more detailed information. This allows a vast degree of flexibility (similar to remedial loops) and students can proceed at desired learning rates having

access to on-demand information literally at their fingertips (mouse functions). Detailed information is provided at every stage so students can have their concerns addressed at any learning difficulty encountered, which may not be realistically feasible in other program designs.

The main factor of this medium is centred on the easy access and availability of required information, through a variety of sources. This is facilitated through the Net, where information on virtually any topic can be obtained in varying amounts of detail. Invariably presentation of the information is done in a trendy style as previously mentioned, in a concise manner with brevity being the objective.

Accordingly students may gain a greater understanding from the Net than with text. The author's experience in this regard was in obtaining information about the Internet and its history. Initially time was spent in reading texts, which generally tended to be a bit superfluous (though Smith's (1995) text on the Internet was indeed interesting and informative), making for more intensive reading. Similar information on the Net was presented by InterNic in subjects lasting 15 minutes each, which were concise and to the point making for easy reading and understanding. The end result was a more comprehensive understanding of the Net through the series than with the texts.

The other communicative delivery involves ardent use of the email facility. This allows the student other alternatives to gain required information through interaction with their teacher, with other students or professional expertise. The flexibility allows information from the teacher, which can be scheduled or planned as in the design, or generated by students within the program, to be sent instantaneously to one or a number of students. Other pathways to such information can be obtained through electronic listboards, bulletin boards, webcasting, for asynchronous communication, and webchat, voxchat, videoconferencing, where synchronous communication is facilitated or even links to other areas (sites) of interests.

CHAPTER 6

DISTANCE LEARNING - APPLICATION IN THE MARITIME INDUSTRY

6.1   Is It Necessary?

The evolution of the maritime industry within the past two decades, has produced numerous Conventions, rules, and regulations, emphasising safety of ships and cargoes, and protection of the environment. This has placed a considerable amount of pressure, to effect and implement in all facets of the industry. This has subsequently resulted in a myriad of information and expertise requirements, which are imposed upon administrations, shipping companies, owners and operators or seafarers alike.

Such evolving has also included a significant growth in shipping, not only in the numbers of vessels being built, but also in relation to increased sizes and tonnage. In line with technical progress, there is also the aspect of technological progress in terms of computer generated technology.   This has achieved increased economisation, reliability and efficiency in shipboard systems.   Vessels today incorporate various levels of computing technology, which perform routine and time consuming shipboard tasks. Designed to assist the seafarer in the execution of duties and responsibilities, vessels range from fulfilling basic IMO requirements to One Man Bridge Operation (OMBO), which is fully computerised.   The level of computerisation onboard, also influences the factor of manning requirements. Since

computers perform the tasks of many at a faster rate, the opportunities to increase profit margins through reduced manning are obvious. It is to this end that studies in quantifying minimum functional manning requirements are being directed.

Despite the trend towards reduced manning, it is indeed ironical that the maritime industry faces a global shortage of certified and competent seafarers in all ranks and categories. This shortage has been manifested from a variety and combination of factors. The most significant of these include the revised STCW 78 (STCW 95) Convention, increased inability of seafarers to function with the computerised technology, and the fact that a seagoing career is no longer attractive to prospective candidates.

Since STCW 95 deals primarily with the standardisation of training and certification to recognise competency in addition to other requirements, the majority of maritime training institutions which provided the industry with its labour source, are no longer recognised to issue certification unless specific STCW 95 requirements are met. This is further compounded by the fact that seafarers, though providing a vast labour resource, are not sufficiently trained to function with the sophisticated computerised systems onboard, and are in effect a liability. The industry in competing for market share and increased profits, has continuously reduced turn around times in port. This has resulted in increased sea time, working hours, and isolation, in conjunction with comparatively low salaries, little scope for self development, and unfavourable working conditions in many instances. The portrayal of a seagoing career taking these factors into consideration, is no longer an attractive prospect, and shore based jobs are preferred. Even seafarers after five to ten years at sea, are presently usually inclined to go ashore at the earliest opportunity.

In regards to the above it is imperative that the parties involved pay cognisance to the training needs of its personnel in meeting the stipulated requirements. Ship owners in the interests of economisation, usually seek compliance with the minimum requirements of IMO conventions. One notable prospect being faced currently is the

fact that computer skills acquisition are not mandatory under STCW 95, except through simulator training in radar and ARPA. However, since the complexity and sophistication of shipboard systems on modern day vessels are computer based, the need for computer skills based application is indeed necessary. The fact that the limited number of institutions are unable to respond to industry's demands, prompts the need to transfer maritime training from ashore, and apply distance learning concepts to validated, skills based competence, and refresher training.

The requirements and responsibilities for administrations and large shipping companies, have necessitated the need for effective information management systems. This can be provided through the use and capability of multimedia software and technology. However managing the information and ensuring its proposed efficiency, requires a specialised function and the need for highly trained personnel to perform the respective duties.

The more important regulations for mandatory and recommended consideration and implementation, by administrations and companies alike, include the following:

- International Safety Management (ISM) Code

- ISO 9000 Series "Quality Systems"

- Class Notations

- Code of Ship, Management Standards of the International Ship Manager's Association (ISMA)

- ILO Conventions and Recommendations

- Charter Party clauses

- Port and Flag State Control (PSC and FSC) Implementation

- SOLAS Amendments and Revisions

- MARPOL 73 Amendments and pollution prevention regulations

- Standards for Training, Certification, and Watchkeeping (STCW) 95

It is unrealistic to expect any one person to be fully conversant with the profusion of mandatory requirements as specified above. However the understanding of them with the correct interpretation, and the ability to access relevant information in a referencing format is the essential component. This exemplifies the necessity for applying distance learning techniques within the maritime industry. In this way an individual can download and assimilate information required when a learning need has been identified, without having to attend any centralised learning centre, or having to wait on the availability of expertise.

6.2 Is It Affordable?

The global recession experienced in the 1970s and 1980s, contributed to a large extent in the application of distance learning methods within the maritime industry. However in any type of training offered, the bottom line is the cost factor where the question of who pays is of grave importance. Morrison (1997) in recognising this factor states:

> "Profit margins are often small, and market forces cause every shipping company to pay careful attention to its capital and operating expenses, and to continuously search for economies."

The main question shipping companies ask of themselves is if they can afford the distance learning and the recommended technology. But due to the growing importance of distance learning, the more realistic question would be if they cannot afford to.

Veiga (1998) in his presentation at the IMLA 10 Conference stressed the importance of the training and education of seafarers in promoting a safety culture. He made

reference to the fact that maritime training institutions in the industry's opinion, did not adequately satisfy the industry's need. Based on a study conducted, he (Veiga) concluded that training institutions and the industry held differing and opposing points of view. The institutional point of view focused on the future development of the seafarer in offering maximum education, whilst the shipowners in the industry expressed the viewpoint that such education should be restricted to traditional learning institutions such as universities where higher education can be pursued at the seafarer's discretion. Such differing viewpoints result in conflicting interests and objectives, which do not facilitate cooperation and the needs of each other.

There is generally a gap between technological advances and training where changes are imminent prior to designing compatible training programs. Advances in electronic and computer technology facilitate ongoing development of 'high-tech' ships, and play an influential role in the development of curricula and course content in training institutions. Training for such ships requires a more functional skills based approach, so subjects within previously used course curricula are no longer applicable, while other subject areas need to be emphasised. The advances in computer technology can effectively reduce the aforementioned gap, through development of distance learning onboard ships. Personnel in developing required competence with new onboard systems, can effectively do this *in situ* through the convenience of CBTs and CAL training programs. This reduces the need for personnel to attend learning institutions ashore, and is cost effective in all aspects.

Though distance learning in a logical context reduces associated costs substantially for all concerned, there is the factor of considerable expense and effort derived in the development and production of training material, which is understandably passed on to the user. Shipping companies in general are hesitant in considering additional expenses which are not mandatory. However they rely on training institutions as a resource in providing and enhancing the professional expertise required in the safe manning of their ships. This is (or should be) balanced by the respective needs of the

parties involved and changing industrial trends, which proffers distance learning as a viable option in overcoming this economic barrier.

6.3 Application Onboard Ships

Today with the development of computer and communications technology, distance learning has become very affordable in all aspects, with positive benefits to all concerned. This results in the safe and efficient management and operation of ships as previously revealed by Anderson (1982), that the company (TEXACO), influenced by growing economic constraints compounded by the fierce competitiveness of the trade, recognised the need to incorporate distance learning methods onboard their ships. He further mentioned that in achieving the objective, it was necessary to initially adopt a new concept of shipboard management, which demanded a change in attitudes and working practices.

The development of powerful computer hardware combined with CD-ROM and CD-I technology, augmented by the growing availability and reliability of electronic communications, has broadened the scope of distance learning and its implementation within the maritime industry. Muirhead (1995 a) emphasises the view that increased availability of computers onboard, facilitates practical training programs to be transferred from ashore utilising the beneficial aspects of communication technology in overcoming the "tyranny of distance". Companies and operators are therefore subsequently assured that their personnel are receiving the relevant training through the interactive processes of multimedia technology.

This could address the various concerns expressed by IMO and the industry which includes the following problem areas:

— Effective English language communication onboard ships

— Systems and equipment operational competence

— Quality and monitoring of onboard training programs

— Assessment and evaluation of onboard training

— Refresher training

Effective use of the technology could prove to be very beneficial to all concerned. Not only do the shipowners benefit from ensuring a high degree of professionalism and competence among their crews, but the seafarers themselves are afforded the opportunity to better develop themselves. Currently, companies such as Seagull and Videotel are designing suitable distance learning programs, which fulfil the requirements of STCW 95. This would facilitate ships in having an electronic library onboard, which can accommodate the training needs of respective crews.

The maritime industry has begun to recognise the potential of distance learning techniques, and there is a growing trend in the use of the technologies as a means to comply with the mandatory ISM Code and other statutory requirements. Capt. Thomas (Fleet Manager, Brittany Ferries) at the IMLA 10 Conference exemplified such techniques in optimising safety training among the various crews of his shipping company. The learning methods employed combined pre-packaged video programs with lecturing methods, which have proven to be quite effective, having a favourable compromise between training and operational commitments. The training is conducted at convenient times onboard and at other locations for the crews, without the need to attend shore based institutions which could affect operational commitments.

Growing industrial demands for competent personnel familiar with the onboard computerised and other technological equipment, places increasing focus on such particular and relevant training with realistic applications. The industry is therefore

more flexible in providing opportunities for their employees to increase their expertise and professionalism.

The growth and development of telecommunications, information access for example the Internet, and availability of CBT and CAL programs have enhanced the capability for the student or potential seafarer to fully utilise the concept of distance learning afloat and ashore. It is now very possible for the individual to tailor and access instructional programs based on needs, convenience, and desired learning pace and characteristics.

The application of distance learning however, loses its effectiveness if introduced randomly based on a novelty approach to the technology, or primarily in showing compliance to fulfil a stated objective. In this aspect the resource would be greatly under utilised with a corresponding negative approach. This is likened to the individual who acquires a computer for the sake of having it, and only uses it as a word processor because there was no plan to effect and exploit its full potential.

Rice-Oxley (1982) recognised two main elements in considering distance learning. One being the emphasis on the individual with regards to his needs, abilities, and practical training possibilities. He recognised that the program, training, and learning should be tailor-made to the student, rather than the student having to fit the program. The other consideration was the necessity of integrating training, learning, and knowledge acquisition into a program where the individual can get beneficial value of the knowledge and experience he needs.

He also suggested the utilisation of distance learning in a maritime environment towards achieving the following objectives required of the seafarer in:

- understanding his/her job better, and being able to recall and understand what has previously been taught.

- improving performance

- developing wider skills and knowledge to enhance potential in performing both at sea and ashore.

- creating a more wholesome individual by widening interest and enhancing personality development.

- achieving these objectives in a better and cost effective manner.

In support of the above, a comprehensive and logical approach towards the application of distance learning within the maritime industry, is in using the basic principle of any training program. Vanstone (1997 b), describes this as 'The Training Cycle', illustrated in the diagram Fig. 5, which can be applied in the development of any training program. Five steps need to be considered for effective application.

1. A **Needs Analysis** should be conducted to identify the areas where training is required.

2. **Solutions** are then developed to best meet identified training needs.

3. A developed **Training Model** is then devised to meet trainees' needs.

4. **Evaluation** of the Training Model is conducted for effectiveness and desired outcomes.

5. The Training Model then goes through some **Adjustment** based on the outcome of the evaluation.

Fig.5 **Training Cycle**
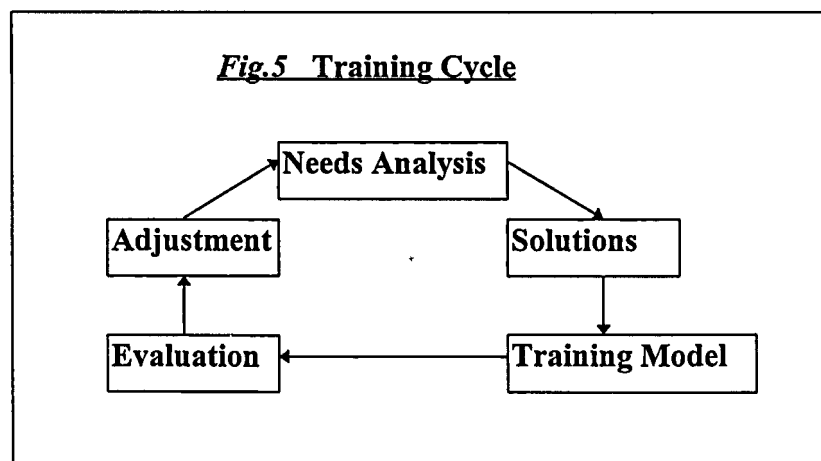
6.4   Implementing the Technology Onboard

The essential factor in establishing distance learning programs is the availability and access to the required information through the development of an adequate database comprising necessary and relevant information. In facilitating required access a viable option in fulfilling this objective is through the use of a Local Area Network (LAN) with access to a Wider Area Network (WAN) such as the Internet or an organisational shore-based establishment. In this configuration, terminals are electronically connected to a central server onboard housing the database, from which it is possible to download information on demand.

Since it is not feasible to provide each terminal with a database comprising the necessary information/programs (hardware and software costs would be exorbitantly high), the 'sharing' of the database resource is ideally cost effective. In the instance of shipping companies with numerous ships and similar training needs, it may be more feasible and convenient to have LAN systems installed on each vessel. This would limit satellite transmissions and the attendant costs, if the central server was located ashore. However, a wider WAN network linking other ships of the company to a shore location could function as a central database, from which additional information could be accessed. Herein lies the feasibility of utilising the 'Floating Office' concept as described in Chapter 4 to effect training objectives.

Though the initial capital costs incurred in setting up the system are considerable, savings are derived through the facility of having ship's personnel conducting their own training, in their own time, and learning at desired paces. This lends assurance to complete understanding and a desired professional outcome. Learning is further enhanced by being conducted within the operational environment, with the added benefit is that there is no loss of manpower and its associated problems.

A wide variety of maritime courses are offered using distance learning technology. In optimising the benefits accrued through distance learning, a program of study should be complemented with onboard training and support. This provides the seafarer with the potential of applying what is taught to an operational environment. In acceptance of the widely expressed fact that '...we retain 75% of what we see, hear, and do', this lessens the risk of memory loss, which is usually experienced when learning emphasis is placed more upon memorising abstract situations or problems in the interest of successful examinations.

6.5   Benefits Derived

The advent of 'high-tech' ships and the increased reliance on computer based technology to assist the watchkeeper in performing routine functions, has changed the previous concept of training. Shipowners are more in need of professional operators to manage the various computerised functions onboard, in assuring safety and protection of the environment. Although computing technology has been viewed as essential despite considerable expenditure in its development, the secondary necessity upon acquisition is the training and development of expertise to fully exploit its beneficial value. In reviewing this, it is necessary to look at distance learning application within the industry in regards to shore based and shipboard environments.

Within the shore based environment it is considerably easier for personnel to utilise the technology than onboard vessels. An essential factor is shore based personnel work regular day time hours, which afford them a greater facility to manage their time more comprehensively. This is augmented by the added benefit of communicating through terrestrial systems, which have proven to be attractively affordable and cost effective even to the individual user.

A report by Reeve (1998) identified the fact that telecommunication costs are continuously being reduced, based on the fiercely competitive market of the telecommunications industry. The varied potential of the Internet now includes and provides the essential characteristics of the telephone, with companies providing unlimited usage irrespective of distance, for monthly subscriptions at low attractive rates e.g. US$15.00. The current and widespread availability of webcams (computer video cameras), and computerised microphones, in addition to affordable user subscription rates, creates the potential for both tele and video conferencing for seafarers undergoing distance learning courses.

The shipboard environment does not have the facility of shore connection, and communication is only effected through satellite transmission. This incurs considerably higher costs for which shipping companies and owners are hesitant in meeting. Though such considerations are understandable, especially when faced with depressed economies, shipping companies and owners lose competitive advantage in being 'penny-wise and pound foolish'. Profit margins though realised in the short term, incur greater expenditure through the lack of professional expertise and the inconvenience of personnel having to source required training ashore. The future however looks promising in respect to reduced satellite communication costs with the development of ISDN, digital compression, the Teledesic System (for Internet access) and LEO (Low Earth Orbiting) satellites. Muirhead (1998 c) reports on a comparative cost analysis, which revealed a reduction of communication costs for shipping companies by more than 50% over a two year period, attributed through the media of fax, telex, and e-mail messaging.

The initial expenditure in obtaining the necessary equipment of software, hardware, and other learning material and equipment though at first is considerable, can contribute to increased profits in the long term, should relevant training be subsequently transferred onboard. Such profits can be realised in replacing the need for ship's personnel to attend institutions for similar training, reducing tuition and

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other institutional expenditure associated with provision of the required training. However the shipowner must first recognise the beneficial aspect of importing onboard training, which is dependent on managerial policies and objectives.

The level of efficiency onboard a ship is proportional to optimum manning requirements (very crucial in the aspect of reduced manning). A greater benefit to the ship owner is therefore the retention of personnel onboard to maintain crew strength, which enables the avoidance of problems and expenditure associated with absence and replacement. The seafarer is also spared the expense in attending institutions and the risk of unemployment upon completion of training.

6.6 Limitations

Facilitating distance learning for the various facets within the maritime industry is mostly dependent on the economic health of the parties concerned i.e. administrations and shipping companies. Although the benefits are prevalent in the long term, the initiating costs are at most times prohibitive. Consequently the question of who pays is a determining factor. Ship owners in devising their strategic planning, incorporate the beneficial aspects of loyalty and commitment from their employees. If they provide the medium of personal improvement, they need to be assured of comparable returns on their investment.

This becomes a 'two-edged sword', as shipping increasingly becomes a lonely existence with the One Man Bridge Operating systems (OMBOs) and reduced manning levels. The potential modern day seafarers enjoy certain benefits and privileges ashore prior to embarking on a sea going career, which have been incorporated within their social lifestyle. In relation to the onboard environment, these mainly apply to the capability of continued education for self improvement, leisure activities, social contact activities, and the access of information and

communication through telecommunications technology. Shipping companies in attracting potential candidates, need to address these issues in providing some tangible benefit to offset the psychological effects of loneliness, boredom, diminishing self worth, stability, financial security, overload and fatigue among other pertinent and similar issues.

Providing electronic communication access is one way where such concerns can be partially alleviated, as social contact can be maintained with friends and families in addition to keeping up to date with current news and information. The company would no doubt benefit by inheriting a more professionally attuned person having the preferred corporate attitude. No doubt shipping companies and owners envisage the occurrence of crews transmitting fairly continuously resulting in abuse and exorbitantly high communications bills. This need not be so, in that systems can be designed whereupon individuals can be responsible for their own transmission costs. The main objective should be in providing the facility.

The requirement for onboard training as stipulated in STCW 95, places the responsibility on shipboard senior personnel to ensure certain aspects of onboard training for ship's personnel, are conducted to evaluate and assess competence and proficiency. However a considering factor is the availability and competence of the onboard trainer and assessor in performing such functions. This does not generally question professional competence, but in proper instruction of respective charges.

Another consideration is the dedication of these shipboard officers in their approach in fulfilling onboard commitments. The present system of operation for ships in addition to reduced manning, places additional stress on individuals. This is further compounded by the fact that little time is afforded for anything other than attention to one's duties and responsibilities. Consequently shipboard officers (based on the manning level) may not have sufficient time to devote to the onboard development of their respective crews. The ship's operational requirements and commitments may also be limiting factors. This is based on the short sea time prior to port entry and

departure, which does not conveniently facilitate shipboard training as required, and still fulfil operational responsibilities and expectations.

The monitoring and verification of performance standards onboard also pose grave considerations for institutions and administrations. Alleviating such concerns require an effective organised and dedicated approach to training by having systems in place to facilitate checks. Though the facility of communication transmission offsets this to a large extent, the quality of monitoring has to be considered. There would therefore be the requirement to train the trainers, with the attendant concerns on how such training may be effected. Information management systems technology can effectively put things in place where such concerns are favourably reduced.

The limitations described are however not insurmountable, but it requires a high degree of commitment on the part of the parties concerned. The cost factor involved is considerable in proportion to the level of efficiency required and achieved. This must however be balanced against the desired outcome.

CHAPTER 7

DISTANCE LEARNING INITIATIVES FOR DEVELOPING COUNTRIES

7.1   Implications of International Regulations

In reviewing distance learning facilities with regards to their application in the maritime industry of developing countries, certain events have given cause for favourable consideration. One of the most prevalent is the impact and implications of the various regulations accepted in the international IMO forum. These relate to the conventions for STCW 95, ISM, ISO, SOLAS, and MARPOL, which have created significant effects worldwide in a broad context.

In fairly recent years the myriad of regulations brought into force have been influenced by disasters impacting on the global community. The effects of these regulations when narrowed down to dollars and cents, have made it very difficult for developing countries to comply within the spirit and intent. The emphasis on parties to play an active role in enforcing these regulations, has increased pressures and anxieties to maintain global credibility. One example is the creation of the "White List" as an indication in fulfilling the requirements for compliance of STCW 95. Developed countries having a long maritime history, are generally proactive in maritime issues and therefore already have within their national infrastructure the means for compliance. Developing countries on the other hand, in having gained some measure of relief in fulfilling the requirements of STCW 78, now find

themselves with a new mandate in having to adopt and adapt to the new regulations. Economic constraints coupled with the necessary expenditure to comply with new regulations, have made it difficult for such countries to sustain maritime training, especially in view of the fact that growing emphasis is placed on skills acquisition and competence.

Although maritime administrations are largely responsible for the level of development of their respective maritime training institutions, there is the additional obligation in adjusting to support market and industrial trends. The increasing complexity and sophistication of ships, demand an additional approach to the preferred outcome, in providing expertise for the functional use of onboard computerised technology. Consequently in fulfilling required and specific criteria, institutions must make substantial changes to their curricula, course content, infrastructure, goals and objectives, equipment, resources, and teaching expertise. The inability of institutions (especially within developing countries) to effectively adjust, has currently influenced more dependence on developed countries and shipping companies and owners, to assist in providing the necessary training and certification.

7.2   Market Resource Issues

Ship owners and companies find it economically viable to draw from the large labour resource in developing countries (as in Asia and the Far East), to meet their manning requirements. This is in part due to the fact that owners utilise the option of FOC (Flag of Convenience) to obtain cheaper crews, and escape own country's classification restrictions thereby increasing profit margins. The question to be addressed however, is the level of training and competence of these cheaper crews. Though the requirements of STCW 95 are intended to address this issue, the realistic

effect is marginalising this manpower resource, due to the inability of training institutions to provide the necessary certification.

The recognised global shortage in terms of available manpower as outlined in a 1995 report of a study conducted by BIMCO, places shipping companies and owners in a situation to determine the availability of competent crews. Many studies have been conducted in determining the possible causal factors for a growing reduction of competent seafarers. With regards to European countries, Zade (1996) identified certain key factors which include the following:

- Flagging out of European ships with a subsequent loss of European berths.

- Declining interest in seagoing careers.

- Lack of loyalty by shipping companies.

- The higher comparable wage costs of European seafarers.

In addition to the above, it is the author's view that this is/would be compounded on a global level, by the fact that developing countries having lost the capability of providing qualified seafarers, would not be able to fulfil market demand. Presently certified maritime training institutions are also incapable, due to available spaces, of addressing the acute global manpower shortage. The coming into force of GMDSS certification is in one instance an area where this is exemplified. Institutions are unable to cope with the present demand for such training within the proposed time frame, and are now adopting distance learning techniques for prerequisite individualised training prior to conducting formal training.

There is some irony in comprehending this shortage with the growing onset of reduced manning requirements and OMBOs. However one must consider the fact that the increased and advanced technology onboard ships, is increasingly reducing the usefulness of the current workforce and making it more redundant, the reason being the fact that seafarers from developing countries lack the kind of quality

training necessary for computerised applications, especially for the new and current technology onboard. This may possibly result in a 'catch-22' situation, where the diminished requirement for manpower could determine the existence and viability in training institutions. If training institutions cannot exist viably, then there may be no provider of seafarers for the maritime industry in the future.

Shipowners, companies, and operators are currently faced with a tremendous challenge in effecting and implementing the provisions of STCW 95 with the new Regulation I-14 and other conventions. Their responsibilities now include ensuring, maintaining, and procuring (on demand) the appropriate certification (having current validity), documentation, records, and other relevant data of their respective crews. Through the enforcement of Port State Control (PSC), seafarers must now have documentary evidence of familiarisation and/or competence in almost every aspect of shipboard duties and responsibilities. The added factor of revalidation (within five years) and refresher training, raises the issue of accommodating these requirements and maintaining operational commitments.

Another major issue in the market resource from developing countries, is the extent of the ability in speaking English. Since it is mandatory that English is used as the primary means of communications within the maritime industry, the knowledge of English varies with seafarers from countries where English is not their 'mother tongue'. This has created problems in communicating, especially onboard ships, resulting in serious incidents leading to safety and environmental concerns.

The IMLA Conference (June 1997) stressed this importance in its Ninth Workshop On Maritime English (WOME), and the fact that no model courses were produced as guidance to course development, despite the requirement for English proficiency under STCW 95. This viewpoint was also shared and emphasised by Dzugan (1998) in his paper on Cross Cultural Communication at the IMLA 10 Conference having recognised the need for a common language onboard ships. In stressing this onboard communication, Dzugan (1998) focused primarily on the aspect of interaction

between and among seafarers having different cultural backgrounds. In a fairly similar context Luzer (1998) at the same IMLA 10 Conference expressed the need to develop and standardise marine engineering phrases to facilitate communication and eliminate the cross cultural limiting factors.

Despite the commendable presentations by the presenters mentioned, and the report by Cole on the WOME workshop with the conclusion of IMO taking the initiative, considerable difficulty would be experienced. Though some measure of objective can be achieved by IMO producing model English Language courses, effective development as with any other language, primarily depends on the extent and frequency of use. Applying the various cultural considerations without this learning factor can be very extensive and no doubt ultimately confusing. STCW 95 made it mandatory for English to be spoken onboard ships, influencing a subsequent inclusion within the curricula of training institutions. The author however wonders about the effectiveness of such language teaching, within the specified time frames for English programs.

Since there is an apparent lack (as expressed by IMO and the industry) in the proper and effective operational usage of English language, the question therefore arises, why is there no recognisable improvement within the industry? Is the quality of training questionable? Is it that the time constraints placed on institutions are insufficient for students' English language development? The author is of the opinion that these two factors are prevalent, in addition to the fact that training institutions use the barest minimum allowable time in meeting the demands of the industry. Apparently focus is placed on fulfilling the mandatory criteria, with diminished regard to the language development of the seafarer.

In a discussion with Professor Cole of WMU on 5 October 1998, he supported the point of view that training institutions adjusted their curricula to the recommended duration of maritime courses by IMO. Consequently such courses were considerably reduced if not withdrawn, and English Language was one of the subjects affected.

He expressed a possible reason that customarily, the responsibility of teaching English Language (moreso in developed countries) was left to the State within their educational system. Therefore once a student fulfilled the criteria of learning through success in the State's examination procedure, subsequent English language training was conducted similar to a refresher and revalidation course, with a lessenned focus on language development.

Although in most instances some evidence of English literacy is produced, countries (more in a regional context) speak English differently, which further compounds the issue, occasioning a varied difficulty in understanding. The author has experienced this at WMU, in having some measure of difficulty in understanding students, who did English language courses prior to and subsequent to joining the university.

Such difficulty is also experienced within the same country, as in Great Britain where difficulty is experienced in understanding persons from different counties. In the English speaking Caribbean this is also very prevalent. Although English is spoken and understood, each country has its unique dialect and speaking mannerisms, which can also be difficult to understand. The author recalls an experience in teaching a class of Caribbean students. He conducted lectures in his normal manner of speaking (more in regards to rate of speaking), and was subsequently surprised when the students were unable to understand what he was saying, taking it for granted that the studens being from the same region would have understood. Where these language understanding deficiencies can be overcome by listening carefully and speaking slowly without any debilitating effects, in an operational environment the result would be crucial especially in situations when the ship is standing into danger.

The highly competetive nature of the industry has created an imbalance in the provision of proper and effective training. A new attitudinal approach to training and management in all aspects is therefore required, especially if the vast labour resources from developing countries continue to be utilised. Shipping owners and companies can no longer leave the responsibility of recruitment to the agent, but

must take a more active role in the training and development of potential seafarers. A favourable balance must be accomplished with regards to substantial allowable time for development. Since market and industry competetiveness does not make it viable and feasible to bring the seafarer to the training, then perhaps it is time that the training be brought to the seafarer.

7.3   Initiatives

The bleak prospect facing maritime training institutions in developing countries is in fulfilling the criteria to meet the requirements for compliance with IMO regulations, and be subsequently recognised and "white listed". Once this is completed, the issues specified above in 6.2 can then be overcome with the provision of the necessary and required training from these institutions. But what happens before then? Do potential seafarers and ship owners wait until training institutions achieve compliance? This does not necessarily have to be so if institutions, and shipping companies and owners work together as recommended by Viega (1998) in facilitating required training. Employing effective, suitable, and convenient distance learning methods and techniques, designed to incorporate both the shore and onboard environments, could address the issues on hand, and be an economical factor in the long term objective.

The flexibility of distance learning offers unique possibilities and opportunities in facilitating training needs. Instead of looking at the possibility of exclusion due to non-compliance, perhaps such training institutions can be affiliated to recognised institutions, at least in the short term, with access to the necessary information for recognised certification. This would still afford the non "white-listed" institutions to be operational during upgrading, whilst still being technically able to accommodate the demand. One aspect is in simulator training for ARPA competence, which can

only be conducted at recognised institutions to gain certified approval. However the initiative presented is that a prerequisite knowledge base can be facilitated and achieved prior to using the simulator. This would reduce the time and subject content for assimilation and familiarisation at recognised institutions, not to mention the capability to accommodate a greater number of candidates than currently experienced.

Training programs can be conducted by both institutions simultaneously, with the recognised institutions conducting training programs, lectures, and seminars in areas outside the scope and expertise of non recognised institutions through the appropriate distance learning medium. Since institutions in compliance with STCW 78, generally/possibly have the professional expertise to complement institutions meeting STCW 95 requirements, such expertise can be utilised as tutors for tutorial purposes as done in distance learning centers.

Many software packages currently available complement the initiative previously described, in facilitating interactive training with a great deal of flexibility. Distance units can be developed and utilised for both ashore and onboard purposes, presented in a variety of combinations ranging from text only to multimedia variety. This in effect would transfer some aspect of maritime training to the ship, coordinated with the institution to achieve the intended outcome. Some of the probable areas as examples are as follows:

- Ship Familiarisation can be done prior to joining, by having and using prepackaged software programs, which familiarise individuals with their intended ship. This would enable them to learn the ship systems beforehand, limiting the disadvantages experienced upon joining without prior knowledge.

- Refresher and Validated Training where the seafarer is able to participate in relevant certificated programs to enhance and maintain professional status without having to attend shore institutions.

- Cadet Training can be complemented onboard to better assimilate training done ashore, and provide a more objective and realistic assessment. This would also enable the trainee to have the available expertise on hand, and to relate the operational environment to theoretical knowledge.

- Safety Systems of a specific or particular nature or even new/advanced systems can be combined with theoretical subject matter being covered ashore, with the practical applications done onboard.

- Other Relevant Training pertaining to onboard duties as required by STCW 95, for the seafarer's certified status such as human related issues and emergency drills, can be easily facilitated with distance programs onboard without the need to leave the ship.

The above listing, though not exhaustive, indicates examples of possible areas where the institution can function in a manner similar to a learning or tutorial center for a recognised affiliation. Using this initiative can possibly assist the seafarer in obtaining required certification without the dire prospect of having to change convenient locations.

7.3.1 IMO/WMU Initiative

IMO in fulfilling its mandate for global standardisation has been assisting developing countries in meeting training requirements primarily through the provision of model courses, and availability of professional expertise. This was extended and

subsequently developed into the establishment of the World Maritime University (WMU), providing professional training to the level of Master of Science degree certification in the maritime areas of safety administration, environment, port and shipping operations, and maritime education and training.

The strategy in a broad context was to provide personnel within the administrative sectors of developing countries, with essential knowledge to support and subsequently implement global objectives. It is hoped that through attrition and continuity (in training other personnel), that the primary objective of global standardisation can eventually be achieved. To date (October 1998) some 1400 students from approximately 135 countries have been trained at this professional level, with a considerable number having the required skills and knowledge to develop their maritime concerns with a large measure of influence in their respective governments.

WMU in being supported by countries and organisations sharing the same vision for global standardisation, has been able to provide quality training through continuous improvements in its equipment and training methods. Inclusive of this is the ability to keep pace with changing market trends and technological advances, to enhance subject matter and training expertise.

Though distance learning methods have been previously utilised in spreading the maritime "gospel" through the availability of expertise and the facility of a few distance learning centers, distance learning has not yet been actively pursued. This could be attributed to a lack of financial resources to implement effective distance methods to achieve the intended outcomes. However, the fact that financial acuity is not favourably comparable with increased financial and cost of living inflation, sustainable efforts in maintaining present training quotas may not be too apparent. It may therefore be more prudent to combine distance learning methodology with currently practised traditional learning concepts at WMU.

One approach is in reducing the time spent at the institution, by having the first year or at least the first semester (when common courses mainly consist of general information e.g. the IMO and United Nations (UN) systems, computer technology, and international conventions), conducted at centralised locations in convenient regions for accepted students. Or more conveniently in having such students complete such common courses, as a prerequisite for institutional attendance for the second year program within their respective countries. Preparatory planning and development of dissertations could also be more easily facilitated in appreciation of realistic domestic concerns pertaining to each student's respective environment. Such training can be positively effected through a convenient and suitable mix of distance learning and communications technology. An ideal mixture would include use of the following:

- Use of CD-ROMs containing relevant information of subject matter e.g. IMO's Vega Database, and other relevant electronic text information (an electronic library?).

- Instructional guidelines or task and guidance studies (TAGS) programs advising students on the objectives, requirements, assignment tasks, particulars and deadlines. Certain activities could also be included to increase awareness of the student's operational environment, which may effect a greater understanding of what is required.

- Use of computer based technology to facilitate electronic communication and interaction between both professors and other students. This will also have the added benefit of establishing personal relationships (albeit in a virtual mode) prior to a physical meeting at the institution.

- Teleconferencing and videoconferencing technology using the "point -to-multipoint" form of broadcasting, or even webcasting (providing such technology is available to the "class") to facilitate "attendance" to relevant group discussions, lectures, and presentations conducted at the institution

for the second year students or proceedings from external conferences. Taped transmissions of the aforesaid would also provide the opportunity to structure lectures in a timely manner that would assist students with required information for assignments. This may possibly take away the aspect of WMU having to accept the availability of visiting professors, whose timings may not be very conducive.

There is a lot of potential to be derived in applying the distance learning concepts with that of traditional learning as previously described. If the learning package (distance and traditional concepts) is properly managed, there is no reason why intended outcomes and objectives cannot be maintained and achieved.

A possibility in student support is encouraging utilisation of the alumni either in an informal manner as in a buddy system, who can be likened to a 'sea daddy' for new recruits joining a ship, where a former graduate would guide and advise a new student by addressing his concerns and preparing him for the WMU environment. This would perhaps necessitate the establishing of a global cadre of competent trainers having similar assessment and evaluative value systems. Such a pool can at least initially be drawn from the graduates of Maritime Education and Training (MET), where they can lend assistance through tutorial support at the learning centres in question.

7.3.2 Perceived Benefits of IMO/WMU Initiatives

There are considerable benefits to be derived by all parties concerned of the IMO/WMU initiative is adopted. The curricula of the degree course would remain the same, but the time factor and associated logistics in accommodating students over a 20 or 17 month period can be substantially reduced. This would obviously incur financial savings in all aspects regarding travel, living expenses, learning material,

and extended time away from home with respect to the students, since physical enrolment at the institution would be reduced by half (being one year's intake). As a matter of consequence, the additional savings could facilitate a 100% increase in the number of students trained, as the same amount of students enrolled within two separate graduate classes, could therefore be combined into one graduate class.

The institution has continuously been improving learning techniques and technology. Presently established are computer and English language laboratories, which facilitate these ongoing objectives in addition to the classrooms, and lecture hall. Students in being made familiar with current technology presently have access to the wide range of information on the Internet, and other social, market, and industrial trends within their period of learning. Additional finance gained through savings as outlined above, can enable the university to acquire and provide essential resources in enhancing the learning environment.

WMU in satisfying the demands for a more knowledgeable and professional individual, are continuously seeking ways in which this can be accommodated. Plans are proposed to afford students on demand information (through access to computer applications and the Internet) at their convenience, by installing a desktop computer in each student's cabin. Additionally, another proposed plan is to develop and combine the English and computer laboratories where greater flexibility in teaching can be accommodated. The proposed use of earphones and computers would enable a teacher to relate to one individual or to the whole class as showing Fig 6 overleaf.

Through the multimedia software design, information could be passed electronically, or verbally to one or all of the students. Students can observe and follow the teacher via the computer terminals, or computerised projection onto a whiteboard, or screen. The development extends with the use of video technology and telecommunications, to transmit and receive broadcasts from different locations, which can be interactively viewed by the class or broadened by incorporating other students (1st year students?) at various learning centres to participate in relevant discussions. This

Fig. 6   WMU Proposed Electronic Classroom

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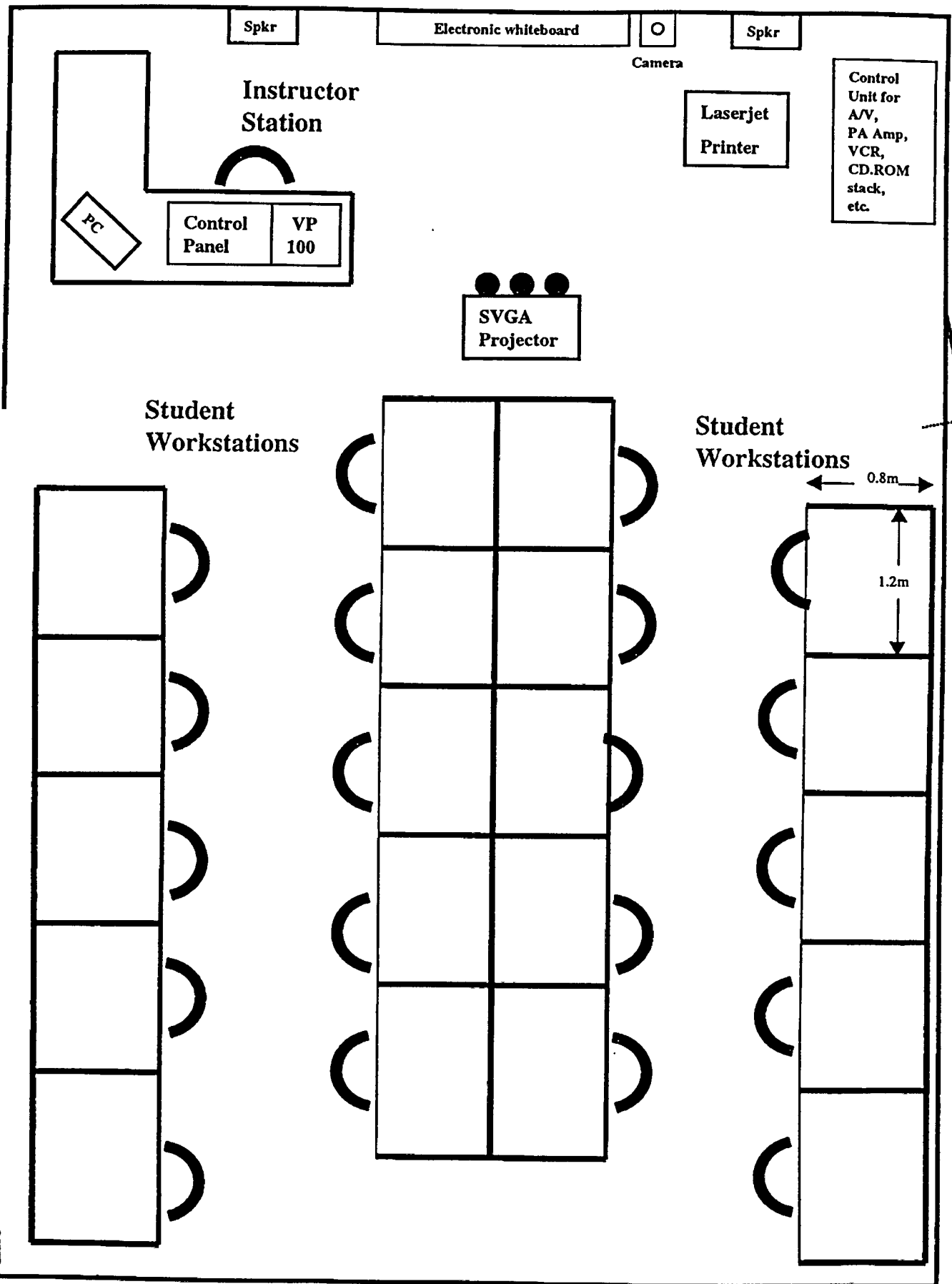
would reduce any perceived feeling of isolation or not belonging, commonly generated among the distance students, and influence a feeling of being part of the fraternity, similar to that of being on site.

The proposed plans in the near future as described above would allow students to take a more flexible approach in regard to their studies. WMU in designing, implementing, and managing distance learning programs, could reach a wider section of personnel at the lower levels of maritime administrations, to further promote the stated objectives of IMO in global standardisation. However as in most other undertakings achieving this aim requires the support of institutional management and financial support.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

8.1   Conclusions

Currently, the line between traditional and distance learning is growing smaller, as institutions seek to integrate and manipulate the two concepts to enhance learning objectives and achieve successful and intended outcomes. Accordingly the distance learning concept is no longer solely for the distant student, but is more and more being incorporated within the teaching strategies of traditional institutions. Despite adverse remarks and comments still being made, traditional learning institutions are recognising the benefits derived from introducing distance teaching techniques within teaching strategies.

It is indeed fair to state that the cost of distance learning tuition is gradually increasing, proportional to the sophistication of the technology employed. This in one aspect is understandable, when one considers the cost in producing distance learning material. Montgomery-Masters (1998) describes the cost of production being approximately 300-500 man hours to produce one hour of quality material presentation using available technology for maximum effect. However one must first determine the cost effectiveness of utilising the marketed material, and balance such costs with one's needs and intended outcomes.

The flexibility of distance learning methods, allows various learning strategies through the spectrum between teacher-centred and student-centred. Both teacher and student can adopt these strategies to be ideally suited to learning characteristics and environments. The fact that anyone embarking on a distance learning course can design a curriculum suited to one's needs, has broadened the scope of distance learning and placed it in a new dimension. In this manner training and learning have been made more focused and relevant to one's needs. This favourably responds to the needs of the industry and society, where current demand places emphasis on an individual having a functional capability.

The television network, Skynews, in their news report on 26 August 1998, stated that industrial demands are currently being made on learning institutions to produce individuals who are of functional benefit to the market industry. Recommendations were made for amendments to the curricula to teach students practical subjects, thus enabling them to be more operationally productive upon entering the market. This would limit the time taken to accommodate orientation and familiarisation, prior to being operationally productive.

Employers are currently in a unique situation where the highly competitive market demands the need for expertise to effectively utilise and exploit the technology available. This would reduce manpower requirements, and maintain productivity on a fairly continuous basis. Consequently employers are not usually in a position where they can easily release their employees be it for training (through attendance at an institution) or otherwise. This point was specified in the interview held with Ms. Carrington, where she overcame the problem by applying distance teaching techniques in providing information on demand or when required. Though this strategy is practised within a banking institution, the flexibility of distance learning enables usage to be adopted in any environment at any time.

Though the obvious benefits derived are suitable for all concerned, achieving desired outcomes necessitates a large degree of commitment from all parties involved.

Accordingly the learning process must be taken into consideration, where then learner is able to favourably accept the information delivered. The recognisable factors determining the effects of the learning process, have been identified as the following:

- *Aims and Objectives* which basically outline the guidelines and parameters of the specified training program, enabling the student full awareness of the required outcomes.

- *Interactive Media* that describes the medium and the manner in which learning is facilitated and communicated.

- *Learning Environment* that looks at where (physical location) learning is being conducted. It also incorporates the attendant distractions pertaining to family and job responsibilities, noise levels, and allowable study time.

- *Instructional Support* regards the level of tutorial support offered to the student. This could range from being all inclusive as in correspondence material, where the student can achieve a successful outcome with little tutor interaction, or have unlimited external access to information from the tutor or other students.

- *Feedback* that is very important to both teacher and student in gauging the level of progress and material presentation. This is deemed to be a motivational factor for the student, in terms of timely assessments from the teacher, thus forming the basis for encouragement and continuity.

In looking at the development of distance learning, and the current methods employed, it is quite obvious that its progress is defined by the development and availability of communication and technology. In this aspect, distance learning viewed as a continuum, shows that improvements are continually being made on previous methods, instead of separate system entities. Accordingly, the various

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methods previously described do not in reality replace each other, but complement previous methods and each other in enhancing delivery of learning, further broadening the range and scope of flexibility within a variety of combinations.

When one looks at distance learning from inception, it originates from the correspondence mode, where the complete learning package was mailed by post to students. The design of this mode in its completed format, provided the student with sufficient and required knowledge for successful achievement, without the need for tutor interaction. However it did not fulfil the learning characteristics of all students and was found wanting, in that there was not complete assurance that students were able to understand all that was written.

Here we see the utilisation of broadcasting (radio in the first instance) which served to enhance understanding of subject matter, with problem areas being explained by personnel with expertise. Complementary to this was the capability to record these broadcasts for subsequent review at convenient times. This also facilitated (through transmission) wider areas, and more distant students were able to be covered and included. The limitations of broadcasts due to extended area coverage, time zones, propagation, weather systems, and physical barriers, were favourably addressed by the development of satellite technology. The provision of delayed transmissions facilitates different time zones, greater area coverage, and reliability of data transmissions. Though costs in relation to satellite usage were/are quite expensive, current technology has greatly reduced such costs (with the advent of ISDN and digital compression) by as much as 80%.

Parallel with technological satellite progress, was the development of computerised technology. This placed distance learning in a new dimension with the advent of computer based programming, and subsequent multimedia interactive capability. In this new dimension, amendments were made to the designing of programs employing and combining the various distance teaching methods of text, video, audio, and graphics. The further aspect of graphics animation combined with audio, greatly

enhanced the learning factor. This created added interest in learning responses. Information access was available on demand through user friendly software applications, so students were more able to learn at desired paces with clarification of problem areas available when required.

The introduction of Internet access came with a profusion of information being made widely available. Students were no longer restricted to information within the respective computer based training (CBT) programs on computer diskette ROMs (CD-ROMs), but to the Internet where a vast array of information in any topic was portrayed. Development of distance programs also included this availability for maximum learning effect. Since distance education is dependent on communication for program delivery and response, the combination of computerised and satellite technology favourably facilitated interaction through communication. This provided immense support for distance students concerning mailing, feedback, and issue clarification.

Since a distance learning package is expected to be effective for all learning characteristics, the language used is a very crucial factor. The distance language found to be effective is one having a conversational style, where the impact created is one of an individualised and personal nature with a simplified language structure. The more text oriented a learning package was, the greater the simplification of the language where such simplification is necessary to ensure complete understanding. However in integrating text with other technologies, the degree of simplification is proportionally reduced being more restricted to on demand information. In deciding to develop a distance program, one therefore has to work closely with the aims and objectives to be cost effective. This ensures that the method used would be the one best suited for particular learning objectives.

The design process is a fairly specialised one, where subject teams are required with each member having a particular responsibility. This includes:

- *Author/Lecturer* who oversees and is responsible for the whole design process.

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- *Content Validator* who verifies the authenticity of the subject content and learning sequence of the material.

- *Course Development Officer* who is responsible for the general structure, presentation of the information, and the visual appearance of the completed package. Duties may also include assisting with staff development expertise.

- *Graphic Designer* is responsible for the typographical format pertaining to style, graphic designs, and other features.

- *Production Personnel* are responsible for the order of the presentation and suitability to the user, together with the processing of documents, pagination, and graphics.

- *Media Specialist* prepares the audio visual material and programming software for the completed package.

Montgomery-Masters describes the design method being initiated with the aims and objectives of the instructional package. This develops through a conversational framework in deciding how the information of each activity is presented and supported. The necessary resources are then identified and acquired, where it is then possible to implement the design. The last stage involves continuous evaluation of the completed product. The cycle of design, implementation, and evaluation is continuously conducted until satisfaction of the whole package is achieved.

The increasing global shortage of competent and qualified seafarers as revealed in the BIMCO/ISF 1995 Manpower Update, stresses the need for training to be provided and developed. Though such shortages were derived from a number of reasons relating to retirement, diminished enrolment and high drop out rates among other reasons, are two crucial predominant reasons. These relate to the impact created by the coming into force of STCW 95, and the increased computerised technology onboard ships. The requirements of STCW 95 have placed a number of previous seafarers without substantial certification, and respective institutions without the

recognition and capability to conduct further training. This is compounded by the fact that computerised technology onboard also limits the potential seafarer (especially from developing labour resource countries), who do not have the necessary training to be operationally effective.

The maritime industry is no doubt very concerned about this manpower shortage, and the availability of competent and qualified personnel. The economic strategies influenced by the recessions of the 1980s, encouraged de-emphasisation of and reductions in training and personnel. However it is currently incumbent that shipping companies and owners cohesively reinstate training policies to reduce the shortage of suitable personnel. Training institutions are not presently capable of meeting the supply demands of the industry. It is therefore reasonably left to the industry to assist, and work together with institutions in the provision of enhancing training requirements.

The requirements of STCW 95 in placing emphasis on competency and qualifications through necessary training and continuous revalidation, have created a situation where pressure has been placed on the seafarer to maintain qualification status. This can be compounded when operational duties are fairly continuous, dependent on the length of voyage and cargoes loaded and unloaded. Reduction in manning levels has also increased the workload, so it has become more difficult to accommodate progressive training. However more difficulty can be derived should the seafarer have to obtain the necessary training ashore. Distance education in this regard can or rather proves to be a viable option onboard, in affording the individual to study and be trained in the work environment, at a suitable time and convenience.

The development of CBT and CAL programs has provided a range of packages catering for the enhancement of professionalism. An example of this is the CBTs developed by Seagull, Norcontrol, and Videotel, where it is possible to have an electronic library onboard with such programs having compliance with international regulations. Apart from being used in formal study, such programs are used as

references to obtain on demand information. Initial or cadet training can also be co-ordinated with shore establishments, in that training instructors onboard can supervise required activities. Though this is a requirement under STCW 95, the onboard expertise needs to be committed to the objective besides their operational duties. There is also the need for these onboard personnel to be suitably trained to provide effective onboard tutoring and subsequent assessment and evaluation. In adopting the 'Office at Sea' concept that further integrates the ship in organisational planning strategies, providing and co-ordinating the onboard training should not be difficult to achieve. An additional benefit is the capability to effectively monitor and control the maintenance of professional qualifications among the crew, which can be configured within the software design.

The shipping industry presently accounts for approximately 75% of world trade and has become international by nature. The shortage of competent and qualified seafarers from developed countries resulting from this evolution, has placed focus on developing countries as a labour and economic resource. This is exemplified from the avid use of cheaper labour primarily drawn from the Far East and Asian countries. It has been recognised though, that the quality is questionable in meeting the requirements of STCW 95. The impact resulting from these and other international regulations, has greatly compounded the manpower factor, as these countries find difficulty in achieving compliance and recognition. The distance learning concept in application to developing countries can therefore be an effective training resource, once effective training is implemented. The onus is however placed on the shipping companies and owners to take some measure of responsibility and provide the necessary initiatives in this aspect.

IMO has taken the initiative in assisting developing countries to establish a manpower resource of professional personnel, by providing such countries with the required expertise to facilitate training objectives. The development of WMU is also included within the framework of these objectives, and plans are proposed to include

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distance learning methods within the curricula. This would greatly improve its course designs in providing information and learning in a more timely and systematic manner.

There would be more appreciative value if WMU undertake the development of distance learning programs within its Masters (MSc.) programs. Such development could increase the enrolment in having the separate graduate classes combined in one class. Candidates accepted for enrolment would therefore conduct the first year in their respective countries through a distance learning initiative. This would also benefit the students who invariably experience adverse psychological effects of being away from their homes and families for the extended period of two years. There would also be the time available to make a more proper assessment of students' capabilities in meeting the requirements for successful completion. Their academic performance would therefore be reviewed within the first year in the distance learning program. This would eliminate the wasted expenditure incurred in transporting and accommodating a student, who after being assessed on completion of the first year do not achieve the required standard.

The evolving of distance learning has embarked on a new level. New communicative technology has largely taken over traditional mail delivery and telephone communications. This has substantially reduced both the costs and time (two important factors in the distance learning concept) previously experienced. The level of interaction has more or less influenced a comparable similarity with traditional learning methodologies. The psychological effect (emphasised by traditional learning theorists) of visual or "face to face" situations has also been realised by the employment of videoconferencing capabilities. Relevant and related information can be transferred or downloaded almost immediately (through Internet and multimedia functions), without the need and inconvenience of having to visit static libraries or source locations.

The exponential growth of technology (computer and communication) has given unlimited potential to distance learning. The widespread availability of the technology has enabled more students to access higher education and training. Though there is still the paradigm that traditional institutions provide the essential requirements for recognised degree certification, this is currently challenged by distance education centres providing similar certification within their distance education programs. As the market industry more and more demands that individuals entering the work-force be trained to function within the operational environment, the use of distance learning methods will be more prevalent, even within traditional learning institutions.

An adverse situation could however develop with increased global inflation, retrenchment, and unemployment, which affect national economies causing additional financial hardships on countries as well as individuals. This could put the costs for basic equipment necessary for distance learning and education out of the reach of the financially challenged individual. This type of learning could increasingly be reserved for the individual who is able to access higher learning at traditional institutions. It is therefore quite possible that there could be a return to the situation where countries would experience high illiteracy, which happens to be one of the primary motives in promoting distance education.

8.2   Recommendations Regarding Distance Learning

Despite the growing importance of distance learning and education, it is still being regarded in some quarters with scepticism. It is therefore essential, that distance learning techniques be applied to traditional methods currently practised. Parties involved (learning institutions, lecturers, teachers, tutors, students, employers, the market industry), need to 'buy in' to the concept and appreciate it, not as a

replacement of traditional methods and institutions, but as a complementing factor to make learning more effective. Ironically this has been the primary objective of learning institutions, but in adopting a teacher-centred style of approach, traditional learning institutions have focused more on teaching rather than learning.

Having reviewed the content of this dissertation on distance learning methods, the author has made the following recommendations:

- Emphasis should be placed more on learning than on teaching in a student-centred orientation. This would enable students to acquire the skills necessary upon entering the work place, benefiting both the employer and employee. The student in practising distance learning methods would maintain focus on his/her objectives through accessing relevant information and related activities.

- The curricula for training teachers should be expanded to include all aspects of the distance learning concept and techniques, to foster a greater understanding and appreciation of its applications. This would further reduce the scepticism and provide more commitment and sensitisation to the student's needs and concerns.

- Institutional centres need to give and show more priority and commitment in support of distance education, instead of having the appearance of being an added to existing aims and objectives, for the primary purpose of following current trends for market share and financial income. Achieving this would require the development of proper and stated (preferably written) policies and guidelines, adequate financial, administrative, and staffing support, complemented with motivational incentives for the arbiters of the distance programs.

- As much as possible, equity between on-site/on-campus and distance students, should be encouraged. This would largely alleviate and address the psychological concerns experienced by distance students, and on-campus

students would also benefit from the positive factors of the distance learning concept.

8.2.1 Recommendations for the Maritime Industry

The maritime industry has been faced with the challenge of meeting mandatory requirements of the various IMO Conventions, which have necessitated changes within their respective operational procedures. The industry in being highly competitive, is continuously seeking ways and means in securing and improving profit margins. The fact that training and manning requirements are the two areas where these objectives are easily achieved, the introduction of 'high tech' ships with sophisticated onboard systems provides feasible reductions in manning requirements. Such vessels cater for minimum manning requirements of as much as six in large vessels with OMBOs. These types of vessels no longer require the skills of the traditional seafarer, but need those instead with highly technical skills to effectively handle computerised systems onboard.

The competitive and international nature of the industry with owners and companies having different financial objectives, results in a wide disparity of standards and operational procedures. IMO in its objective for global standardisation has implemented various Conventions to address this deficiency. The impact created has been especially realised in the acquiring of competent and qualified personnel to man the respective vessels. The need for training is therefore prevalent with the realisation that training institutions are unable to facilitate the market demand.

Accordingly the following recommendations are proposed by the author to address the concerns of the maritime industry with respect to training and the use of distance learning methods.

- Shipping owners and companies need to play a more active role in providing training. They therefore need to work closely and cooperate with training institutions to ensure an adequate supply of qualified and competent personnel. Though initial and possibly capital costs are barriers to adoption and implementation, they must be balanced with a collective long term objective of reducing the current global shortage.

- Since institutions are unable to meet the demands of market supply, more onboard training should be encouraged, which can be facilitated with CBT and CAL programs. This would enhance learning interest as it would be relevant and applicable to the operational environment, and encourage a professional attitude and approach. This would also facilitate the personal development of crews, aiding in the retention of personnel.

- The curricula for masters and chief officers at least, should include training in teaching and instructional methods, so that proper and standardised assessments and evaluations of trainees can be made in co-ordination with training establishments. Such officers should also be able to provide instructional/tutorial support in the training of their respective charges.

- The need for crews to become operationally familiar with new onboard systems as quickly as possible, would be accomplished with respective onboard training packages. This would feasibly reduce the requirement to attend shore institutions for similar training. An example is training in GMDSS (Global Maritime Distress and Safety System). Training establishments are unable to provide the necessary training for all seafarers by the specified IMO deadline. CBT simulated programs are therefore being utilised as preliminary and introductory training prior to attendance at institutions for certification. This reduces the time and expense spent away from the work place.

- Ship owners and companies can also encourage their respective crews to maintain professionalism and certification, without incurring much additional

expenditure for mandatory compliance. Adherence to compulsory policy decisions where personnel are required to do specific CBT courses, can be effectively monitored. Record keeping systems built into the respective software, would ensure monitoring integrity is maintained, and provide necessary documentation on demand.

- The current focus on increasingly computerised onboard systems makes a strong case for the additional mandatory requirement of computer based skills' competence. Therefore the need for onboard desktop simulation programs to offset 'high tech' deficiencies among crews should be most apparent. Whereas this is presently specific for ARPA systems, a potential danger could be apparent with the lack of operational knowledge of such systems as is evident in numerous cases.

- The apparent reduction in the performance of routine tasks, encourages greater reliance and dependency on electronic computerised systems. Standard operational procedures should alleviate this factor by routinely and constantly double checking the data output, using methods and equipment independent of the electronic systems. There have already been many instances where such reliance has resulted in crucial incidents, when the Officer of the Watch (OOW) neglected to appreciate the fact that the ship was standing into danger.

8.2.2 Recommendations for Developing Countries

Developing countries, especially those which provide a substantial labour resource, have been greatly challenged with the impact of STCW 95. Maritime training previously provided is no longer recognised unless the requirements of compliance are duly met. They face the daunting prospect of markedly increased unemployment for potential seafarers, not to mention staff previously employed in maritime training

institutions. This is compounded by the fact that such countries face various aspects of economic restraints. They are most likely incapable to some extent of upgrading facilities and staff, far less in meeting the specified deadlines imposed.

The increasing inclination towards 'high tech' ships having OMBO systems, and integrated bridge systems with their profusion of computerised technology, propels the need for additional skills, which such institutions may not be able to readily provide. Developed countries need to appreciate this predicament, and assist training institutions in remaining afloat. Distance learning methods provide the capability in fulfilling this possibility. The following recommendations may address this issue.

- Maritime training institutions in developing countries need to be affiliated to recognised institutions, which will provide required training in deficient areas, and the necessary certification. Since training institutions in developing countries have achieved a large measure of compliance with STCW 78, it is quite possible that they could provide suitable training in specific areas having STCW 95 compliance. This would reduce the large numbers of seafarers requiring mandatory training and certification, consequently reducing current shortages, as previously exemplified in preliminary and introductory programs.

- Regional training centres should be established with pooled resources to provide recognised certification. Shipowners and companies should invest in these establishments as long term objectives, in developing a pool of resource personnel to cater for future manning deficiencies, which would be essential in realising mutual and individual objectives.

- Cooperation between maritime training institutions and the shipping industry should be developed to ensure and assure qualified and competent seafarers suitable for current and changing industry requirements. The needs of the seafarer must also be taken into consideration to encourage personnel

development and satisfaction. This would also influence the positive attributes for all concerned.

- IMO should increase the opportunities for training to be effected in assisting developing institutions, with personnel having the expertise to conduct relevant training in the respective countries. Though this may not be widely or wholly feasible, it could be effectively coordinated with course programs for maximum learning effect.

- The fact that WMU is seeking increased attendance, distance methods should be considered to enhance cost effectiveness and increase the annual graduate numbers. This can be made possible in conducting the first year of the Masters program through distance learning methods, in the respective countries of accepted candidates.

- The concerns and requirements for English Language are becoming more prevalent. It would be more beneficial and expedient if English training programs are designed utilising computer based technology, in a similar format as currently produced with other languages. IMO could sanction such programs, which can be incorporated in training courses to ensure standardisation. Using distance learning concepts would place a higher guarantee in all seafarers attaining a suitably accepted standard.

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