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WORLD MARITIME UNIVERSITY
Malmö, Sweden

**THE INTRODUCTION OF COMPUTER AIDED
LEARNING TO THE SAUDI ARABIA BORDER
GUARD NAVAL INSTITUTE**

By

AL - EHAIWI SULAIMAN A. M
Saudi Arabia

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

MASTER OF SCIENCE

in

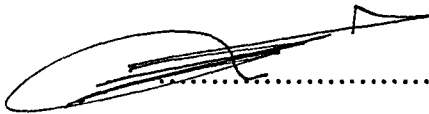
MARITIME EDUCATION AND TRAINING
(Nautical)

1998

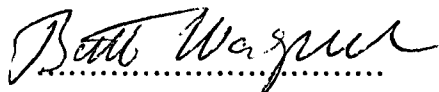
DECLARATION

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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ABSTRACT

The goal of this dissertation is to bridge the big gap between the present situation of BGNI and the other developed maritime institutions. In this dissertation BGNI was subjected to a detailed study. The developing use of the computer and its progress from the first generation to the present time has been efficiently used in developed maritime institutes. In addition, the reasons why BGNI benefit from the advance of CAL are suggested.

This study includes the different aspects which are demanded for BGNI. The conditions and environment at features of the KSA that led to the establishment of BGNI, are narrated. Accordingly, a study of the development plans, tasks and responsibilities of the BGNI stresses the necessity to keep the institute in touch with the advances in technology in MET.

The educational situation of KSA in general, and at BGNI in particular, is prefaced. Computer modes as enclosures for the educational, training and management subjects are explained. Also a discussion about the theoretical basis of CAL is attached.

An evaluation process for computer program and instructor staff at BGNI are in need of reform. The reformed evaluation process will help in the progress of using computers for MET at the BGNI. Comments about the management at BGNI explain the important role of the information and communication technologies to the management process at maritime institutions.

Finally, the dissertation is conclude with the recommendations for the use of computer technology as an aid for learning and training at the Border Guard Naval Institute.

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LIST OF ABBREVIATIONS

KSA	The Kingdom of Saudi Arabia
BGNI	Border Guard Naval Institute
SABG	Saudi Arabia Border Guard
ABC	Atanasoff- Berry Computer
ENIAC	Electronic Numerical Integrator Calculator
EDSAC	Electronic Delay Storage Automatic Computer
EDVAC	Electronic Discrete Variable Automatic Calculator
UNIVACI	Universal Automatic computer
MICR	Magnetic Ink Character Readers
VLSI	Very Large Scale Integration
LSI	Large Scale Integration
CAL	Computer Assistant Learning
CML	Computer Managed Learning
CAT	Computer Assisted Training
ITS	Intelligent Tutoring Systems
CGI	Computer-Generated Image
PC	personal computer
ERS	Engine Room Simulator
PTS	Port Task Simulator

CHAPTER ONE

INTRODUCTION

The Border Guard Naval Institute (BGNI) was established at the beginning of the 1970s. Thus, it could be considered as rather new in the field of maritime education and training. Its foundation was based on the need for an educated and well trained personnel, in order to fulfil the requirements of the Saudi Arabia Border Guard (SABG) and its responsibilities and tasks covered the need of the Kingdom of Saudi Arabia (KSA). The graduates are assigned military vaccines. Rapid development plans were admitted to improve the education and training standards of the students. The BGNI has made good progress in maritime education and training with respect to its age, but this is not enough to reach the high standard of the old advanced institutes. BGNI has to evaluate and to improve the whole of its education system and the major item in this concerns improvements in the use computers in the education and training operations.

The development of technology has given a great and magnificent tool to the teaching and learning process. This tool is the computer, which has helped in the progress of maritime education and training. BGNI has to realise the developments of the computer in order to remove the lack of understanding and its uses in education. It has to keep in touch with the advanced uses and programmes in order to get the most benefit out of this tool. The experiences of the other institutes in computer use would give good knowledge to the maritime education and training being performed at BGNI.

The information about the use of computer at maritime education and training institutions states that the computer has not been used to its full potential. Many researchers are still at an investigatory stage. Yet the advanced maritime institutions are depending upon the computer as an aid to maritime education and training, as well as in their administrative management. One of the aims of this study is to identify the importance of this technology to the Border Guard Naval Institute, in order to improve its maritime education and training. The difference between the education system and maritime education and training can be neglected. As the background education of individuals can form and shape their studies at maritime institutes, an investigation about the modes of computer programmes as enclosures to the educational subjects is included.

The aim of this dissertation is to show the possible use of the computer to raise the students' education and training levels. The capability of computer assisted learning in helping the student to learn is evaluated. The study states that computer assisted learning is suitable for maritime education and training processes at BGNI.

To achieve the objectives of this study, many fundamental aspects are investigated. These aspects include the following points:

1. The development of the technology of the computer and its characteristics in teaching and learning.
2. The modes of computer programmes and the theories of learning and instructional process and its uses for BGNI.
3. The educational system as a background for maritime education and training at BGNI.
4. The use of computer assisted learning at BGNI.
5. The use of the computer in the management process at the BGNI.

This dissertation has been divided into two directions. The first one is towards the uses and advantages of using the computer in education, in general, and maritime education and training in particular. It was easy but exhausting, it was easy because a huge number of references, research, studies, conferences and lectures were at hand. It was a pleasure for the library staff to provide the author with the needed references. It was exhausting because it required too much time to read it. The second direction is towards the BGNI. This was not an easy task but, nevertheless, it was comfortable. It was not easy because of the lack of references about the BGNI and the difficulty to get the required information. Personal notes, as the author is a member of the staff at the BGNI, and several dissertations, written by senior colleagues of the World Maritime University, were the guides in this direction.

CHAPTER TWO

THE ESTABLISHMENT OF THE SAUDI ARABIA BORDER GUARD (SABG) & BORDER GUARD NAVAL INSTITUTE (BGNI)

2.1 A geographical view of the Saudi Arabia coast line

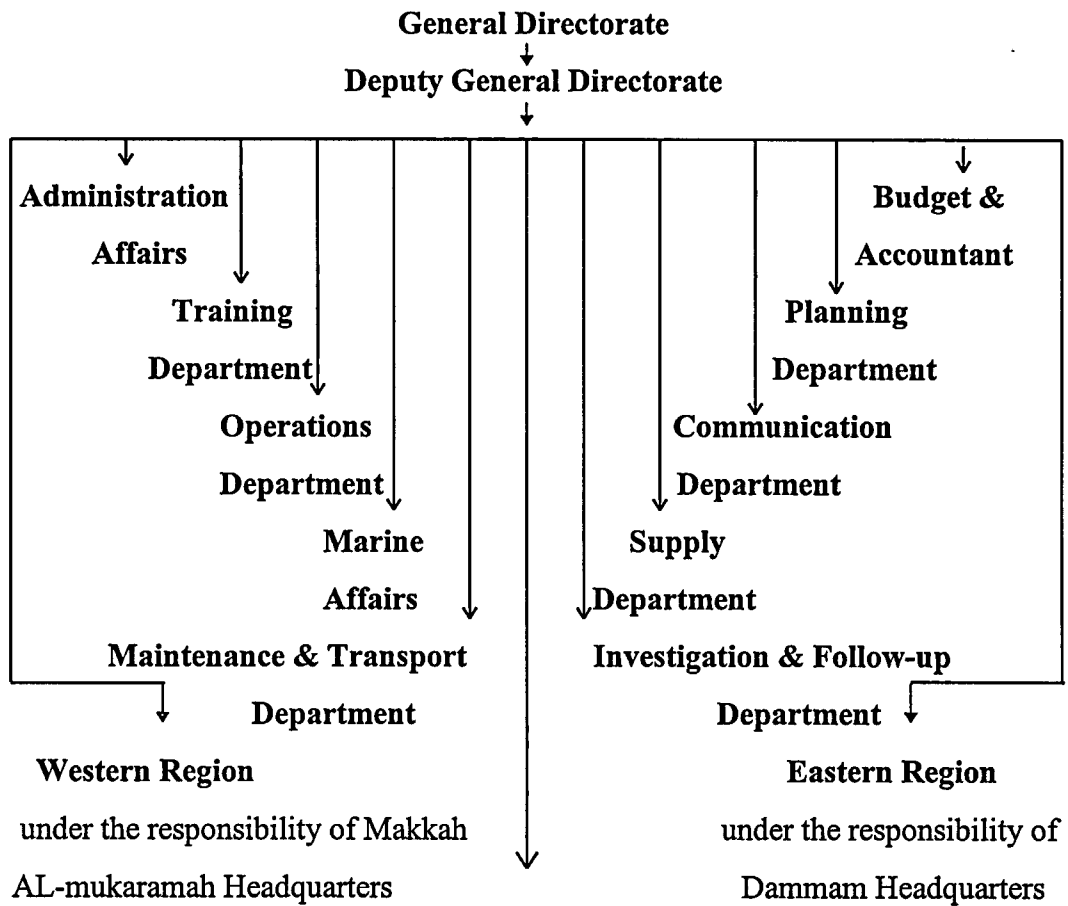
The Kingdom of Saudi Arabia (KSA) is adjacent to the sea from the east border on the Arabian Gulf and the west border on the Red Sea. The total coastal length for both borders is 2300 km. The distance between the two harbours, Yanbao on the western border and AL-khafji on eastern border is more than 8000 km. In addition, both borders are considered scarcely inhabited. If we exclude Jeddah and Dammam, the rest can be considered deserted areas except for few little urban communities plus some industrial areas, especially on the eastern border.

2.2 The early days of the ASBG

After the First World War was over, the "Frontier force, Harbour and Coast Guard" was established in KSA and it was appointed to be responsible for guarding the coast and borders. It included several departments, each of which had a chief who controlled all the responsibilities and activities of his department, and who reported to the Deputy General Director who had to forward these reports to the Director General of the SABG. At that time it was difficult to find educated persons working in the Maritime field. So the headquarters of the SABG depended on young

fishermen, some mechanics and personal skills. In addition, were used to perform the required tasks a few items of equipment, small boats and mechanical workshops.

2.3 The organisational structure of SABG



- Tabouk Border Guard Headquarters
- AL-madina AL-monawarah Headquarters
- Gizan Border Guard Headquarters
- Najran Border Guard Headquarters
- North Border Guard Headquarters
- AL-jouf Border Guard Headquarters

Every region consists of a maritime district, units, maritime stations and check points.

Figure 1 the organisational structure of SABG

2.4 Responsibilities of the SABG

Since the date of establishing the SABG up to 1990, SABG has undergone several changes in commands and developments. As the whole aspect of life has developed in the KSA, the SABG was affected and great steps of progress were made. Eventually, well trained and educated men were appointed; it was always provided with advanced facilities and vehicles in order to be able to fulfil all the required purposes and tasks. Under the provision of article 3 of the Border Security Royal Ordinance the general responsibilities were defined as follows:

1. Military responsibilities concerning the security of the kingdom borders were taking care of the following tasks:
 - a) To give early warning of unusual movements on border lines.
 - b) To make surveillance of any movements across the borders and adhere to the laws governing such movements.
 - c) To co-ordinate with other military departments according to the rules and functions of the border guard.
 - d) To check and inspect the vessels in the territorial sea.
 - e) To detection and arrest smugglers.
 - f) To investigate and arrest criminals on board vessels.

2. Civil responsibilities which took care of the following operations.
 - a) To provide marine search and rescue operations, assistance to shipping, navigational aids.
 - b) To provide assistance and guidance to the persons in border areas.
 - c) To issue regulations to the fisheries and to make sure that these regulations are observed. Also to discover and deal with any pollution crisis.
 - d) To be ready to deal with any collision between vessels and provide the necessary rescue

3. Marine surveillance with three ranges: The SABG was provided with multipurpose vessels to carry out patrolling in the long, medium and short range. They were armed with weapons and equipped with fire fighting and search and rescue equipment. The design of these vessels takes into consideration the high temperature, humidity and the dust winds on the eastern and western borders.

2.5 The need for an institute

After the Second World War was over, the world lived in a technical revolution with the invention of transistors and computers that affected the whole life in all its aspects. The invention of the transistor made a great revolution in communication resulting in the, radio, telephone, fax, telex, and most other electronic equipment.

Due to the previous facts there was a need for well trained personnel and advanced equipment to make the borders safer. In order to achieve this, KSA required an institute to graduate qualified and well-trained persons who should be accustomed to the equipment they were going to use. The individuals and equipment will be the subject of the coming chapters. Individuals without equipment are useless. The same applies for equipment without well-trained personnel. Since equipment is under constant development, one has to keep ones personnel familiar and updated with these developments. That is why a training centre or an institute was needed.

2.6 The foundation of the institute

In 1970 a design was made to establish the Border Guard Naval Institute (BGNI). The objectives of establishing such an institute in the beginning just to:

1. Retraining some officers from SABG to work in the maritime field.
2. Training individuals from the army to join SABG and work in the maritime field.
3. To find candidates to work in the marine section and patrols.

2.7 Stages of development of the BGNI

2.7.1 The first development

After eight years, it was necessary to make developments for the Institute. So the Saudi Government issued the order number (176) in 1978. It gave good support to the foundation of the Border Guard Naval Training Institute, the former name. That helped the Institute to find new technical and managing occupations, and supported it with technical and management experiences in different categories. The tasks which were required are as follows:

1. Training and preparing qualified naval officers for different technical military appointments to fulfil the needs of SABG units and marine workshops.
2. Training and preparing the naval soldiers who were working in SABG in various and special technical fields.
3. Following and revising all the references for the maritime training for the purpose of development.
4. Carrying out research and technical studies that would be necessary to improve the SABG.
5. Set examinations to the naval officers and soldiers for promotions.

2.7.2 The second development

In 1987 the General Director noticed the disturbance levels for the graduated officers and soldiers. So he issued his orders to improve and develop the training and learning programs and schemes. A study was made concerning the positive and negative aspects for the previous period; the positive sides to be encouraged and improved, and the negative technical and management aspects to be avoided and not to be

repeated. Hence, a plan with three major bearings was submitted to the General Director. These three major perspectives are as follow:

1. Education

A study was made of this term which concluded that education is very important to the development and progress of the institute. It stated that education should be on three levels.

- a) General knowledge.
- b) Education.
- c) Special education.

Consequently, great care was taken to chose the major titles and the detailed subjects. There should be a fixed time for the study in the institute, the attendance should be controlled, the books should be in a simple language, truthful and attested by logic. In this aspect, traditional methods were in use. The use of computer was not yet in mind. The study at the institute was by reading books and attending lectures either in classrooms or in workshops. The training process at the institution was done by using few equipment's. Onboard training was very difficult to carry out for the lack of vehicles. It was replaced by lectures at workshops. So at that time the use of computer as an aid tool for maritime education and training was not thought about it, because of the following.

1. The use of the computer was so limited .
2. The technology of computer was not so advanced as it is now.
3. The UN-easy language of the computer that made it difficult to deal with the computer with out the necessity to know programming language.
4. The architecture of the computer was still in progress. It was big in size and small in storage capacity.
5. The researches and studies of the potential use of computer in education were not yet completed and theorised.

6. The high prices of the computer was an essential reason for the limitation of its use at that time.
7. The qualified staff to operate the computer was not easy to find and it was costly.

2. Individual Education and Training.

Officers, who had graduated from universities, were appointed to provide the institute with qualified staff. It was also meant to provide the institute with the important and necessary buildings, workshops, laboratories and stores. In addition, five new sections were established:

- a) Training methods section.
- b) Education and schemes section.
- c) Intelligence section.
- d) Personnel and general affairs section.
- e) Religious section.

3. Logistics

The institute was provided with technical training and supplementary needs, as well as primary equipment. In 1990, a large number of modern and highly developed equipment items were brought to KSA. Difficulties in handling and dealing with the new equipment was soon evident. This situation required extensive training on using and employing the computer in both the SABG and BGNI.

2.8 The tasks and responsibilities of the BGNI

As mentioned in 2.6 the objectives of establishing such an institute were in the beginning modest. After the regular changes and developments, the objectives also developed and the responsibilities increased. With the new challenges to face, the tasks and the responsibilities of the BGNI increased in number and importance. These tasks and responsibilities comprise the following:

1. To provide SABG with the necessary qualified and highly trained individuals
2. To be responsible for the education and training process
3. To keep in touch with the advanced maritime knowledge and the new technologies in the maritime field.
4. To specialise persons in educational and training courses in order to polish their experiences and raise their education level.
5. To arrange visits for experts to lecture at the institute.
6. To attend and share the work and research from international conferences.
7. To co-operate with other departments and provide them with the necessary maritime information needed.

2.9 New perspectives and attitudes

After the second Gulf crisis was over, great attention was paid to the institute as well as to the whole army; orders were issued to improve the maritime education and training. Moreover, special care was paid towards electronic equipment, where the advanced computer played a great, large and determined role in this war, and it was as something to be compared with T V games. The need to do successful applications forced to approve the use of this equipment for controlling, training, communicating, managing, educating, teaching and learning as well as in the battlefield. Hence, the computer was the master of this new era.

The continuously increasing need for the BGNI to develop demands a bridge to cross over to the world of modern maritime education and technologies; this revolutionary leap calls for the application of modern computer based education and training. Most importantly is that instructors at the institute should understand the capabilities of these modern systems and how to harmonise and introduce them to the BGNI cadets in the most effective manner.

CHAPTER THREE

THE INVENTION AND USE OF THE MAGIC TOOL

3.1 What is it?

Through the following historical glance it will present and define the most fantastic machine in the human life. By illustrating the idea of inventing such equipment, and its need. 5000 years ago the invention of numbers and letters was a great step in the progress of humanity. Then man started to record these words and numbers on stones, bones, wooden sheets, and later on papers and in books. Afterwards man started to think of an easy way to calculate; he used his fingers, stones and wooden plates. Moreover, in order to make it easier, the algebraic and arithmetic ways were explored, which helped to a large extent the first trials for inventing a machine which could compute. The first trial was by the French BLAISE PASCAL in 1642. Also the German GOTTFRIED WILHELM LEIBNIZ made some developments that enabled the machine to multiply, to divide, and to find square roots.

Through out the last century a lot of trials were made by CHARLES BABBAGE, GEORGE BOOLE and the trial of HUMAN HOLLERITH with his punched cards machine to build a computer. By the end of the last century, humanity took a big and important step by inventing the telephone, the microphone, electricity, photograph camera and radio. The microphone is used to record sounds and to hear it whenever and wherever we want. Also photograph camera is to record sights to see whenever and wherever we want. Thus we could see sights and hear sounds through moving

films whenever we want. Therefore why not record or photograph the information to use it in easy and fast way whenever and wherever he is in need of it.

3.2 The demand for computers

Between the First and the Second World Wars a remarkable revolution occurred, it was the industrial revolution. This event demanded and developed factories, cities, roads, cars, trains, schools, universities, aircraft, airports, ships, ports, commerce, military equipment and the required education/training programs for further progress.

All of these elements needed reliable information, to keep it, to get it as fast as possible whenever it was needed. In 1939 Thon V Atanasoff made his first trial to build an electric computer. After the Second World War was over, the need for a computer became necessary and urgent because of invention of the atomic power.

Afterwards the world became like one country, because of fast transportation and communications. Knowledge and information were not difficult to get, but the difficulty was how to deal with them, where and how to keep them, how to arrange them and how to restore them as fast as possible. The computer became a necessary machine, especially after the invention of the transistor which reduced its size, then the invention of the silicon chip, which minimised the size of the computer to a pocket size. According to the fast development the computer can be classified into generations. There are five generations; a study about each generation will be closely examined in the coming section.

3.3 The five generations of computer

The development of electronic technology would not have happened without the development of communications and transportation, which controlled by the

computer. Communications means telephones, telex, fax and internet and transportation vehicles, cars, aeroplanes, airports, ships and ports. All of this would not have developed without the development of the computer. The development of the computer passed through five main stages. These stages were respectively developed in steady, fast steps. The five stages, or the five generations, were developed within a short time of fifty years, more than the development which has happened since the invention of the ABACUS up to 1944 when the first automatic machine was built.

All the early machines were made of wood iron and brass, where the devices were pulleys, levers and gears. That is why they were heavy, unreliable, slow in operation, required larger space, and was operated manually. The work of Dr. George R Stibitz was essential in the building of the first electromechanical machine. This machine was able to perform arithmetic operations and was used in 1940. At that time it was called a complex calculator. Then Mark 1 was one of the early electromechanical calculators and was the first automatic machine in the world. This Automatic Sequence Controlled Calculator was ready to work in 1944; "the Mark 1 was 15.5 m long and 2.44 m high, contained 760000 parts, used 926 km of wires, and weighed about 5 tons". (Spancer 1982). It operated the four arithmetic operations and it could calculate trigonometry. This Mark 1 stayed in service for fifteen years, in spite of its slow and very limited storage capacity.

3.3.1 The first generation

At the end of the Second World War, everything was moving fast. The previous emperors were exhausted, new emperors born and became strong, the political events, the new discoveries and the new arrangements of the world were in need of control. Information and new developed methods were required to face the New World. The tradition methods and thoughts vanished. New free thoughts and

attitudes governed all aspects of life. More of liberty was demanded. New systems and ideas were planned and put in action to organise and arrange all of these changes. To do this new tools and machines must exist.

Mechanical machines were replaced with electromechanical machines, which were faster and more reliable than the former. Moreover, vacuum tubes were used in the electromechanical computers. Between 1942 and 1956 new discoveries were made for example the atomic bomb, hydrogen bomb, rockets and the expanded space discoveries. Hence, a series of developed electromechanical computers were built successfully.

An IBM punched card machine was built in 1934 by Dr Jhon V. Atanasoff. It was operated mechanically to do calculations. After five years, together with Clifford Berry he built a prototype computer named the Atanasoff- Berry Computer (ABC). This computer had a memory of 45 vacuum tubes.

COLOSSUS, is a special purpose computer. It was built for the British intelligence to solve the German code. It was provided with 1500 thermion valves and an optical read to receive the message by a roll of punched tape in 5 bits. The output of the teleprinter was a rate of 5000 characters per second, with the aid of an electric typewriter. It was able to calculate, to compare and to deal with some arithmetic and logic problems; it was plug by controlled board and switches. A large number of electronic circuits, which was provided in the machine, made it fast and reliable in calculations.

Dr. John W. Mauchly and Dr. Jpresper Eckert invented an Electronic Numerical Integrator Calculator (ENIAC), at the University of Pennsylvania. It was able to operate all the arithmetic operations. It could also operate up to 500 additions per second. Though it was relatively slow and reliable, and it could perform several

operations in parallel. Its input and output used an IBM card advanced punches machine. The Electronic Delay Storage Automatic Computer (EDSAC) was built at Cambridge University.

The inventors Eckert and Mauchly built the Electronic Discrete Variable Automatic Calculator (EDVAC). It was different from ENIAC in two ways. The internal storage of instructions was in digital form. The second difference was the use of numbers. It required a large space and it generated heat. The Universal Automatic computer (UNIVAC) was the first commercial computer built by the same inventors of EDVAC.

IBM manufactured IBM 701 and IBM 650 which were followed by IBM 702 and IBM 704. The IBM 702 was for business use whereas the IBM 704 was for scientific use. Then IBM 705 and the IBM 709 were released. These computers were unreliable, generating heat and requiring a big amount of power. All models were provided with vacuum tubes.

3.3.2 The second generation

Due to the invention of the transistor, which was smaller, cheaper and more reliable than the vacuum tube. The electronic technology opened a new age of exchanging information, that helped to discover and develop new equipment. Its solidity made it easier to handle and package. In addition, it generated less heat and was 1/200 of the bulky vacuum tube. This meant less in distance for the electrical impulse to travel, thus less power was required. Another advantage was the possibility of combining more than one transistor in one integrated circuit. The popular machines of this generation were the IBM series, NCR 300, Honeywell 400 and CDC 3600 then CDC 160.

3.3.3 The third generation

The common characteristic of this generation was minimising the electronic circuits by excluding the weirs and etching them. Tiny crystal structures replaced the vacuum tubes and transistors. The invention of integrated circuits gave computer technology an important advance. Integrated circuits can be combined together as one unit which can contain many components connected together on a thin small piece of silicon called chips. These chips are relatively inexpensive and very reliable. The problem of this generation was the difficulty of changing from one computer to another. In order to do so users had to rewrite their programs. A peripheral device for one computer could not be used in another one.

The system 360, which was presented by IBM, is the first family of compatible computers. The storage device of this family was developed and became more faster and larger in capacity. Magnetic Ink Character Reader (MICR) as an out put device was attached. Also scanning machine as input device was supplied to this family of compatible computers. It had the capability to use the communication channels to allow automatic input and output. Moreover, an automatic system for the versatile software was included.

3.3.4 The fourth generation

The most distinctive characteristic of this generation was the use of Very Large Scale Integration (VLSI) and Large Scale Integration (LSI) with the use of virtual storage techniques. VLSI allowed using ten of thousands of components on a small, thin silicon chip. Later micro miniature circuits were used to produce microcomputers and minimising memory chips. The production of mini processors, memory chips, micro miniature chip and the manufacturing of VLSI helped in manufacturing small, reliable and fast computers with large storage capacity.

3.3.5 The fifth generation

The use of VLSI in the computer drew the attention of the concerned persons in computer technology to think about the limitations of the computer. They started research and attended conferences to exchange the expertise and to discuss the future of intelligent computers. The birth period of the fifth generation started where the architecture of the fourth generation provided widely for the imaginable thoughts about the limitation of the computer and the requirements of the users. At that time the use of computer was not as it is now. It's use was limited to purpose assignment for private organisations. The researches and studies about the computer were in secret. The advance countries considered these studies of high level technology and one of its own national security.

This high level technology of computer was prevented to be exported to other countries. A lot of money was paid, the process to get this high level technology was too much costly. Also the language of the computer was not easy. All of this were obstacles in the operation of manufacturing computer on a commercial scale. The interior development problems of most countries forced them not to share the costly process of this high level technology. These countries realised the actual potential use of the computer, and what it can do, the after 90s.

As for KSA the problem of the middle east and the interior development problems deprived it from sharing the developing operation of the computer. Teaching computer in the KSA started late of the 90s. The KSA paid attention to the use of computer as an aid tool in education only since eight years ago. That is why the use of computer in MET at BGNI was very far away.

3.4 Major features of the fifth generation

Basically the computer was invented to do numerical calculations. However, now the demands are much more than that. Scientific requirements have been increased and the demand for global exchange of information has become higher. Hence, a new generation of computer is required. The individual processor is not enough; several processors must work in parallel and increasing the parallelism was the aim of this generation. This process intends to allow the possibilities to fetch the data and instructions from the stored programs and data from the memory by the same mechanism operation simultaneously.

In USA a project was in discussion and progress, it was called an Artificial Intelligence project. Also in Japan a project called the fifth Generation was of the leading agenda items of a discussion meeting held in Japan. The researches of the two projects concerned about computer capabilities and limitations.

The fifth generation of computers can be characterised as an artificial intelligence computers. Such a system will assist people to understand and deal with the information they get. They will have the ability to make decisions, where this system has the ability to understand language and images; thus, it will increase the learning ability of the people through voices and images. Moreover, The expert systems are another feature of this generation. These expert systems are the product of the applied techniques of artificial intelligence in some specific fields, similar to the expert knowledge of a person in aeroplanes, driving cars or lecturers. Three systems have been developed and applied in the fifth generation, which have become distinctive features of this generation:

1. The development of VLSI technology enabling the accomplishment of computer hardware functions.

2. The ability to store various data in the form of a database, and the ability to use these data through a mean program to get the answer. This is a knowledge information processing system.
3. The ease to operate by standardising the keys fixed on the in-put board device. This facilitates the interface between human and the machine and exchange information with each other using voice, pictures and diagrams.

The fifth generation computer will not eliminate the previous computers, which were used before the 1990s. The previous grades can be continued to be used for office data processing or for office computation. The information management are applications that will be more important in the 1990s computer. This means that computers of this generation can be linked to each other through communication circuits to allow global exchange of information.

Computer technology is tending to reduce the computer in size to make it useful in other fields. For example, the computers that are used in cars, aeroplanes, domestic computers, modal technology, maritime technology and personal computer are small in size.

An interesting feature of the fifth generation is the various simulation applications. These applications may be the first effective and tangible results in really making a revolutionary progress in the field of education and training. Where aircraft and ship simulators are considered vital and fruitful means of training to real situation conditions.

3.5 The architecture structure

The above development of the computer was accompanied with architectural development. The data flow architecture dealt with irregular and regular close-

coupled parallelism; it is flexible and extensible. Computer technology developed the computer as well as the structure, components and language of the computer. The structure of the computer consists of three major units. Each unit includes parts, each of which is provided with elements:

1. The central processing unit. It includes the important part of the computer and coordinates the following:
 - a) The central parts which co-ordinate the operations of the whole computerising system.
 - b) The arithmetic or the logic part.

2. The storage parts, or memory, are the parts which store the information and the data and represent it on command later. These storage parts are of two types:
 - a) Main storage. This is connected directly to the central processing unit. That is why, it is a fast memory, and further on it is divided into:
 - I. A semiconductor memory, which is of large number of components connected to each other on a tiny silicon chip. This is called integrated circuit.
 - II. Magnetic core storage part, which is made of a large number of tiny doughnut-shaped rings of a ferromagnetic material, fixed on a crosshatch of fine wires.
 - b) Auxiliary storage. This part is slow and as a supplementary storage to the main storage. It can be a:
 - I. Magnetic disk. This element is of high capability to store large memories with a reasonable price. It looks like a small phonograph record. Information is recorded on this disk in the form of spots. It is also can be found as a floppy disk which can be used in small computers.
 - II. Magnetic tape. This is the same as a magnetic tape cassette. It can be considered to have large capacity of storage and is cheap.
 - III. Magnetic drum. This is of the same material as the magnetic disk but of a drum shape.

IV. CD-ROM. This is high large storage. It is able to store hundreds of gigabits of characters on a thin plastic disk.

c) The output / input unit; This includes two parts:

- I. The input unit is the unit through which the information and instructions are interred to the computer. It converts the input text to magnetised spots.
- II. The output unit. This is the part that gives the answer; where it converts the answer from magnetised spots to a language that can be understood by human. It can be as a visual display or printer. The auxiliary storage elements can be used as input or output devices as well.

3.6 Hardware and software

As the implementation elements developed valves, transistors and integrated circuits, the hardware became more powerful and more complex. Only the engineers responsible for its architectural design and construction knew about the operation of the hardware. It is obvious that more software should be interspersed between the hardware and the users. Layers of software were introduced, which is known as operating systems which replace the real hardware with a virtual machine. The most important layer is the outermost interface. It is presented by the application programs to the outside world. Efforts were made to design, produce and maintain the software; however, this development is costly. Software engineering, due to the increase in demand for software, looked for a design of a program with a structure whose correctness can be easily determined. Some important abstractions were included such as modularity and data concealment.

3.7 The module system

A module system means that the program is divided into independent systems modules. The user can deal with any module through its defined interface, which

allows the information flow through it only. The user cannot enter the basic structure data of the program because he lacks the methods. Thus the users cannot know the internal details of the data. In addition, the users cannot erase the programmed data, because the necessary basic information is invisible and the remaining is hidden. This means that all operations are nothing but messages between objects.

3.8 The spectrum of computer uses

The development of the computer from the first generation to the present fifth generation and the development of the implementations and architecture structure gives the computer an important role in all aspects of life. It was transferred from an item of top secret military equipment to a game played by teenagers. It became the necessary tool for most works and professions. In order to get the highest potential efficiency of the computer, it should be capable of executing the required job to meet the user's needs as close to reality as possible. Accordingly many computers of different sizes were designed, super computers for big organisations, and the microprocessor for personal use. In between, medium-scale and small-scale computer systems, minicomputer systems, and special purpose computers were manufactured for the hard tasks.

The following chapters will show the importance of the computer in maritime education and training, executing tasks, managing and directing. The studies will consider the challenges which affect positively or negatively the role of the computer as a medium for education and training in various subjects and various fields.

CHAPTER FOUR

THE EDUCATION AT BGNI AND THE AFFECT OF COMPUTER

4.1 Education in the Kingdom of Saudi Arabia (KSA)

KSA, as well as other countries, has been affected by education technology. Although the Kingdom has paid a great attention to education systems since its foundation, schools, colleges, universities and educational centres were established all over the kingdom. The education process is applied through educational programmes and schemes, taking into consideration the Islamic religion and the distinctive traditions of the kingdom and society.

At the age of six years children are accepted at the elementary schools for six years. Religious and Arabic language are the most important subjects. Intensive courses in the above two subjects are studied and the pupil should pass these two subjects. Local history and geography are also included together with arithmetic which is an essential subject. Introduction through coloured plates of animals, plants and stars is included. After six years the pupil knows how to read and write.

The primary schools accept the students who pass successfully the sixth year of the elementary studies. The subjects are still the same respectively with some changes in science which is split into parts: physics, chemistry and biology. Arithmetic is divided into two parts which are algebra and geometry. The English language is added at this stage for three years.

The students, who pass the final examination at the end of the third year, are admitted to secondary school. At this stage the subjects are still the same, with more specific and more details in the study of the titles. The period of study at this stage is three years. At the end of the third year, a general examination is arranged by the Ministry of Education all over the Kingdom. The total marks will determine at which colleges the student can study.

From the elementary phase to the secondary phase the traditional ways of teaching are adapted. Computer Aided Learning is only available in a few private schools. The universities and institutions are under the management of the government. These universities include different colleges which graduate students in various fields of knowledge. Under the supervision of the Ministry of Education, foreign associations establish and manage some institutions. However, some other educational and training institutions are under the management of the official governmental departments. BGNI is under the direct supervision of Saudi Arabia Border Guard (SABG) which in turn is under the Ministry of Interior.

4.2 Education at the BGNI

The Institute has to deal with four levels of education. The students from the elementary level are those who know only how to read and write. The students who have the competence certificate of the preparatory and secondary schools are of better education. About ten percent of them have some experience with computers, while those who have come from universities and high technical colleges can be considered of excellent education, and all of them have some experience dealing with computers.

Based on this national educational system, students from different levels may be admitted to the BGNI at which special courses suitable for the acquired educational

levels are given to the admitted students. Some of the various streams of technical courses for different levels are presented in Appendix 1. Moreover, to upgrade and refresh the Border Guard soldiers knowledge and skills, specific short courses are allocated to them. Some of these courses are illustrated in Appendix 2. In addition, short courses are given to the Border Guard Naval Officers already engaged in the Border Guard duties. These short courses are illustrated in Appendix 3. Also special courses for Border Guard Naval Officers already engaged in the Border Guard duties are illustrated in Appendix 4.

The BGNI, co-operation with other governmental departments, provides some special technical courses for the Saudi Arabian Civil Deviance and Saudi Arabian Airlines personnel comprising search and rescue, diving, guarding and security procedures. Moreover, the Saudi Arabian Royal Guard personnel are trained at BGNI to be qualified for the national and technical operation of short range naval craft.

An overlook of the education and the use of the computer in education will illustrate how the BGNI can make use of this media in order to qualify reliable individuals of good and high education. From the above, it can be said that education is the way to sharpen the skill of human knowledge by giving him clear and distinguished instructions and information.

Moreover, the development of information technology gives new ways and methods in teaching. The availability of computer at reasonable prices gives the student, as well as the teacher, an additional channel to enter the change of information; it even makes the communication between them more distinguished and easier. The computer capability in assisting learning was for the last two decades the major subject for computer technology. Further on, the studies, which were made could give a convincing and determined argument whether the computer can replace the

teacher, and how far the computer can help in teaching. If it can be considered that computer programmes are useful and helpful in the teaching and learning processes, it would be of use to offer a good tool for maritime education and training, taking in to consideration the nature of maritime education and training.

4.3 Computer Assistant Learning (CAL)

The computer has been used in teaching and learning for decades. Also the computer has been used as an aid for teachers. It is used to assist the student in the learning process. So Computer Managed Learning (CML) is to refer to the computer which helps the teacher in the teaching process, while CAL refers to it as a support tool for the student. The aim of Computer Assisted Training (CAT) is to give training to the student which can be used as an education and training tool. In spite of the different ideas and models which were discussed about the use of computers in education and training, the uses and applications of CAL can be classified into two kinds:

1. Instructional use of CAL. This kind of CAL allows the information to flow between the student and the source through a communication channel. The chosen communication channel would affect the performance of the system, because the messages entered are changed in the communication channel and each element of this process is affected respectively. Figure 2 illustrates an educational communication process and Figure 3 illustrates the use of computer in an instructional process.

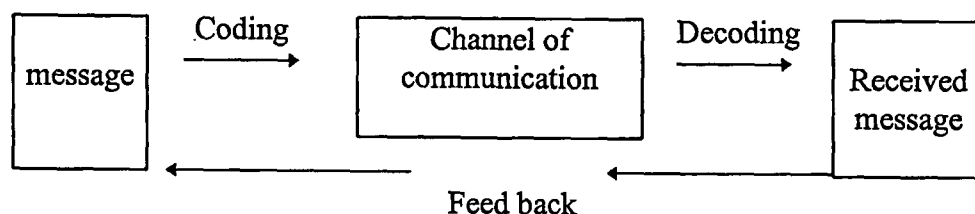


Figure 2: An educational communication process. Adapted from Teaching, Learning and Communication (Hills, 1986)

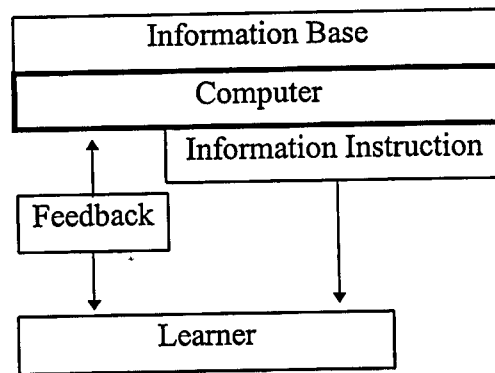


Figure 3: The use of computer in the instructional process.

2. Non-instructional use of CAL. In this kind of use of the computer acts as an instruction information processor. It gives the student the corresponding information to the student's input. In this kind the computers may be considered as a support tool to the student. Figure 4 illustrates the use of the computer as an analysing and processing tool.

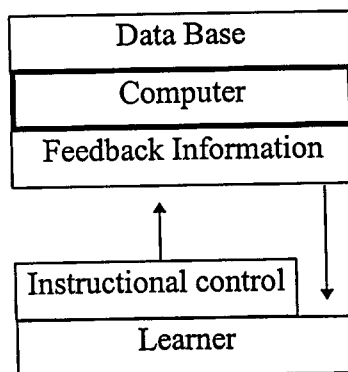


Figure 4: The use of the computer as an analysing and processing tool.

4.4 CAL Modes of delivery and interaction

The use of the computer in education and training has been increased, either by teachers or by the students. So the computer performs as a tool of teaching (delivery) and as an aid in learning for learners (interaction). The level of interaction largely depends on the programme itself, through its flexibility which enables the learner to

act with more options. Interaction can be considered as the most useful feature of the computers in the teaching and learning process. Some consider the learning experience for every student could be subjected to the individual needs, modes and pace of the student; hence, the computer can individualise instruction which can be considered as an advantage to computers in schools.

Modes of delivery and interaction are mentioned here according to their cognitive function, with a note that any computer programme may share more than one of the modes illustrated in the coming paragraphs. That means any subject can be programmed in any mode, or in combined modes. The programme developers choose one mode or more to present the educational subject. So the use of modes depends on the programme developers and not up on the educational subject. So a serious evaluation for each programme should be carefully and reasonably made. According to the result of this evaluation the programme may or may not be recommended to be used at BGNI. Because if the student could not get any advantage of the programme he will lose his interest in the educational subject. The choose of modes is very important. It may give negative respond instead of positive one.

4.4.1 Testing and assessment

The testing mode uses the computer to check the student's knowledge and skills and to determine the educational level of the student. Education and training without assessment is a waste effort. This mode stresses on the assessment rather than looking for excellence, also the feed back will not appear. The advantage of this mode is its capability to collect and process the individual knowledge. This mode neither delivers knowledge or skills to the learner, nor allows the learner to think and communicate with the information. This testing mode can provide a solid foundation for the assessment of the student. This mode is good for the entrance examination to

the BGNI. The questions can be stored in the computer and they can be accessed whenever the tests are needed. The teacher only has to choose which questions should be presented to the students. The students have to push the correct button. In this way a very fast and accurate evaluation for the education level and skills of the students can be made.

4.4.2 Drill and practice

This mode uses the computer as a delivery media. Here the feedback immediately is provided to the student after each response. This means step-by-step the information is delivered. Moreover, it is designed to present exercises on the knowledge and skills that the learners have gained. Endless exercises can be presented at the student's own choice and according to his progress and learning style. If the student fails to give the proper response, the more effort the student contributes, the better result will be gained. Also, the answer can be shown upon the request of the student. This feedback response can enable the student to learn more in a short time.

The learner can gain more through the repetition offered by this mode, so it is useful for routine and repetitive courses depending upon the development of basic skills and the background of essential knowledge. This mode can be used not only for learning arithmetic, spelling and foreign languages. Where it should provide practice, it also can be used to solve problems. Complex problem solving subjects can be programmed in this mode, physics is an example subject.

4.4.3 Programmed tutorial

The programmed tutorial is a step-by-step, self-paced instruction, adapted to the student's learning style, pace and level of learning. It may take the learner from virtually no knowledge of a topic to a very high level of understanding. Its technique

is to take the student through a particular topic in an efficient and simple way. This mode provides the student with individualised and self-paced instruction and it can keep records and trace the progress of the student. Immediate response can be shown on the display by feedback and adaptation to the student's learning level. This mode is difficult to develop, unlike the human tutor. The computer is bound to define regulations and methods. In general it is slow in interaction and cognitive functioning and has narrow pedagogy. It may eliminate social interactions, demands considerable computer access and is difficult to create and use. So this mode is recommended for the cases where a well-defined set of information and knowledge must be acquired. Also it is suggested to be used where there is no access to human tutors.

4.4.4 Conversational tutorial

The conversational tutorial is a program of tutorial modes. This program aims to achieve higher order cognitive subjects, such as abstract concepts and conceptual sacht (Romiszouski, 1986). The main point of this mode is placed on the reasons behind a particular response. The response of any given problem is not commented on as right or wrong, but is analysed for further in depth questioning or reasoning. This mode shifts the focus schooling from factual learning to procedural learning and in turn group interaction. It is also highly interactive and promotes decision-making capabilities, cognitive development of life and discovery learning skills. The fault of this mode is the possibility of the danger of blocking the acquisition of expertise. This is primarily because of its high dependence on rules and analysing activities and the treatment of the learner as a 'perpetual beginner'. This mode is suggested to be used where the learner is not told how to solve a problem. Instead, he should be guided to combine or recombine previously learned rules into a solution strategy that may be applicable to similar situations.

Modes 4.4.3 and 4.4.4 In author's opinion are useful for the new students at BGNI, who are shy and feel shame of asking (passive people). these modes give them the opportunity to discuss and ask the computer, it will help them to memorise the information they want. It will give them the ability to collect new information and to transfer these information to knowledge.

4.4.5 Simulation

The use of the computer in this mode is to create and imitate a real or artificial system or imaginary condition or situation in which the student may control the interaction; thus, it can develop the experience and knowledge of the learner. This mode is commonly used in most educational and training programmes. The purpose of this mode is to solve a problem, or a situation which could be difficult or impossibly time consuming, expensive and even dangerous to deal with in reality. In this mode problem solving, decision-making skills, creativity and social interaction can be presented to the learner as well as the acquisition of knowledge. Also, it provides intrinsic motivation and develops the 'extra poultry properties of the human mind' (Samson, 1985). Also, it offers the student an opportunity to recognise mistakes and learn from experience.

Simulation can be useful in attitude development that has been proven relatively ineffective in traditional classroom learning. This means it may also be used for assessment of demonstrated skill. Moreover, simulation is one of the advanced methods of education and training especially where it can be applied to a full scale exercise covering many related or inter-related tasks. This is divided into two major groups. First group teaches *about* some thing. this group has two sub-categories, *physical* simulation and *process* simulation, both of them are differ from other simulations in that they are not as interactive. Second group teaches *how* to do some thing. In this group there are two sub- categories, *procedural* simulation by which

the student must imitate the same procedures of operation, the other sub-categories is *situational* simulation which deals with the attitudes and behaviours of people in different situations.

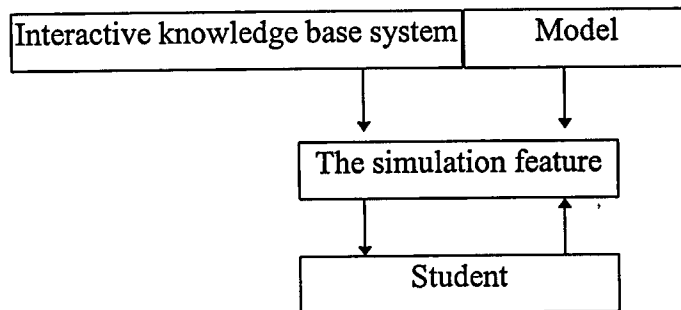


Figure 5: A model of simulation mode. Adapted from Computer-assisted Learning (Rushby, 1985). In The International Encyclopaedia of Education.

In spite of the great development and uses of this mode the experiences gained through it are not necessarily totally reflecting real life situations. In this mode an abstract and simplification of reality could cause the risk of misconception. The real success of this mode relies heavily on proper initial orientation and follow up. Also the time required from both the teacher and the student often needs several hours to complete. However, simulation has always contributed to speed up education time.

4.4.6 Modelling

This mode permits the student to programme the computer, by setting rules, in order to simulate a real life condition, situation, system or phenomenon. In this way the student learns by trying to determine the underlying rules of a specific subject. This mode is built up on an interactive knowledge based system. It can be considered similar to the simulation mode.

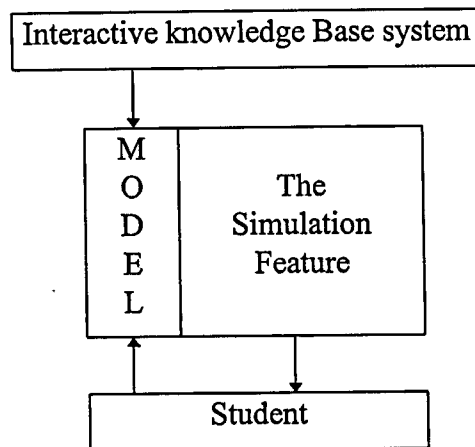


Figure 6: A model of the CAL mode of modelling. Adapted from Computer-assisted Learning (Rushby, 1985). In The International Encyclopaedia of Education.

This mode offers pure cognitive development, unlike simulation, which offers surrogated real life experiences. It provides a unique opportunity for the student to learn a particular process in-depth. The use of moulding can lead to a full comprehension and mastery of the subject. The biggest disadvantage of this mode is its requirement for programming knowledge. Also the time and effort required are wasted. Nevertheless, modelling rates highest in developing the student's creativity and innovation.

4.4.7 Programming

This mode uses the computer programming language in solving problems. It includes analytical and logical thinking. It has two important purposes. First, the student can develop particular programming skills. Second, the transferable problem solving and the creative skills can be developed. The real effort of this mode is not clear, where it shifts the focus of factual learning to perceptual learning. The use of this mode aims at higher levels of cognitive development. In addition, the learning process it self is lightly motivational. There are some problems in using this mode. Such as difficult to analyse.

4.4.8 Inquiry

The use of this mode is to get the necessary information from an organised database for a particular educational subject. It depends on the storage capacity of the computer. The student can make use of this mode by the collection, manipulation and evaluation of information. This mode is very flexible as an individual learning system. In this system, the information can be obtained in other methods than the computer; however, the computer offers speed. It can be designed to deliver appropriate materials to the student according to his background knowledge. It saves time and effort. The use of this mode in the learning process depends on the student's perception. It can be useful for students who can understand, differentiate and evaluate the information. The large quantity of information flow may cause confusion to the student and effects negatively the learning process if it was not subdivided into definite stages.

4.4.9 Expert system

This system is a computer-based system that is designed to work as an intelligent aids to decision making in all sorts of tasks. It includes some tutorial and simulation software. This system is a result of the artificial intelligence researches. The artificial intelligence is a field of computer science that focuses on the development of both hardware innovations and programming techniques, that enable machines to perform tasks that are regarded as intelligent when performed by people. This system is a computer program that simulates the human expertise solving problems. Similar to human experts, it is approached by an individual with a problem. The system briefs the individual about a certain status of the problem, searches its own knowledge base for pertinent facts and uses rules that reflect the knowledge of an expert, processes the information, arrives at a decision and reports the solution to the user. The expert system works with three parts:

1. The knowledge base. It is the rules that control some particular field.
2. The inference engine, which is able to infer new knowledge from the response given by the user.
3. An explanation module that explains to the user how decisions were reached. It always refers to the rules.

4.4.10 Instructional games

In this mode the student has to possess and master certain cognitive skills. It helps to develop creativity and problem solving. It facilitates the acquisition of skills and knowledge. It polishes the student's decision-making capabilities. However, the educational objectives are not always identified and clear. The instructional games that are introduced to the student should be chosen carefully. They should be chosen according to the educational level, learning environments and activities.

4.4.11 Word processing

This mode is a system that has the capability to store large quantities of information. It displaces, corrects, revises, changes and prints in an easy and fast way. It teaches the writing skills and facilitates the actual motor writing process of the student. However, it does not provide any direct learning materials to the student. The only useful application of this mode has been found in language learning.

4.4.12 Spread sheets

This mode is a matrix of lettered columns and numbered rows, horizontally and vertically respectively. It is useful to achieve various tasks, such as records and budgets maritime works and to organise test scores and assignment in the schools for teachers and students.

4.4.13 Power point

This is a flexible programme. It combines the visual display with the necessary sound and atmosphere. The educational purposes in this programme are limited. That means it can not present a full educational subject. But it can present an educational idea or an experiment. It is useful aid to the lecturer, it provides him with the necessary slides and figures related to the subject. It provides the user with a varied range of choices and options. The user has only to choose. There is no educational dialogue between the user and the equipment.

4.4.14 Intelligent Tutoring Systems (ITS)

These systems are very effective software tutoring systems. They can provide tailored instructions to the student. Artificial intelligence systems were used to present testing instructions. These testing instructions are shown one after another in a fixed order according to fixed program. The developer of the program who determines what is presented, how much information is presented, the order of presentation and the specific questions to which the student must respond controls the instruction. The students interact with the computer rather than merely responding to it in a pre-specified way. Tutoring is often used in dialogue style as a response to the student input. Interactive multimedia and hypermedia systems are used by ITS to find a learning sequences in a form that can be easily understood by the student. ITS can create and solve problems, store and restore data. Also it diagnoses the student's mistake and provides a remedial instruction to the student. It selects the suitable and acceptable teaching subjects. Various programmes are presented to the student by the ITS. Many of these programmes incorporate simulation and games that allow the student to 'try out' their abilities, and increase their knowledge.

4.5 How could the use of modes help the education at BGNI

The above mentioned modes are some of large and various number of modes. The programme developers choose the mode to present a subject. Some modes are preferable to be used for educational subjects, others are useful in training process, while some are excellent for management. Modes can help the educational, training and management operations at the BGNI. The BGNI deals with different levels of education and skills as it is mentioned in this chapter. Students of primary level prefer subjects in simple modes. They will get more self-satisfaction if they dealt subjects in an instructional games. For example, this will give them the motive to use computer with more difficult modes. The refreshing courses for officers, who have good experience in computer, are not recommended to learn subjects in instructional games mode. If they use such modes they will feel fed-up or boring and they will miss the opportunity to get more information to form their knowledge. For example, expert system mode with a lot of (if and then) or programming mode would give the officers the motive for more challenge in their carrier. The use of computer at BGNI would be more interested if the modes that include the educational subjects are chosen carefully according to the students' standards.

4.6 The theoretical basis of CAL

Psychology has direct influence on the learning and teaching process. Research and studies have found that human beings are of three types according to these psychological influences and responses.

1. Active people who are self-motivated. They act according to their own instincts.
2. Passive people who are influenced by their environment and heredity.
3. Interactive people who are influenced by their physical and social conditions, which forms their behaviour and characteristics.

The potential of computers in meditating the teaching and learning process is based on an assumption that people are either natural-passive or interactive. Interactive people are affected by their physical and social situations that shape their action and reactions. Behaviourism controls the origin of the computer pedagogy. Thordike's law of effect assumes that the behaviour or action which is followed by self-satisfaction has more effect than that which is not so followed. The idea that people learn to strengthen their attitudes and self-confidence is not sufficient as a basis for an instructional technology, because the main aim of instructional technology is to promote new learning.

4.6.1 Skinner's theory of learning

Through his operant conditioning theory, Skinner stated that the most important is not the stimulus but the response followed by positive reinforcement. The student will be rewarded and learning will be reinforced by the immediate feedback that the response is correct. Learning exists when a particular behaviour is reinforced and the more immediate the feedback the better the learning. He stated that the systematic presentation of teaching material could improve the learning process.

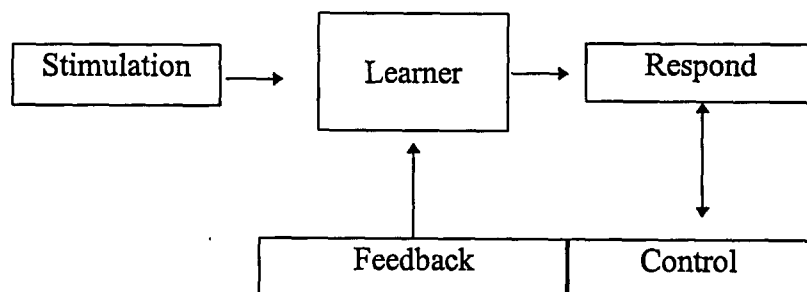


Figure 7: Skinner's model of behaviour control. Source: Designing Instructional Systems (Romiszowski, 1981)

Proper scheduling of contingencies of feedback is one of the most important principles of effective teaching or learning. The information is to be presented in

small steps. The real need of education is to give the student what he can learn faster and easier with less effort and time. This can be done by making use of devices such as computers, projectors, videos, moving films or even interactive system. The linear approach to programmed learning instruction allows the learners to follow different routes according to their cognitive level and understanding. This approach has basic characteristics:

1. The subjects must be presented in small, easy and defined steps or units in respective order.
2. The subjects must be clear, well defined and presented.
3. The response of the student must be clear and easily understood in order to give the proper reinforcement or the corrections.
4. Feedback must be issued immediately after the responses.
5. The program must be flexible and-self paced in order to give the student the chance to move according to his own speed.
6. To ensure the secondary and extrinsic reinforcement such as grades strong verbal and positive facial expressions should be implemented.

The above thoughts can be applied through the drill and practice mode and partly through the tutorial mode.

4.6.2 Gange's thoughts

Gange arranged eight categories of learning as shown in the attached diagram. From his point of view, to reach the complex of problem solving it should proceed from the very simple conditioning phase.

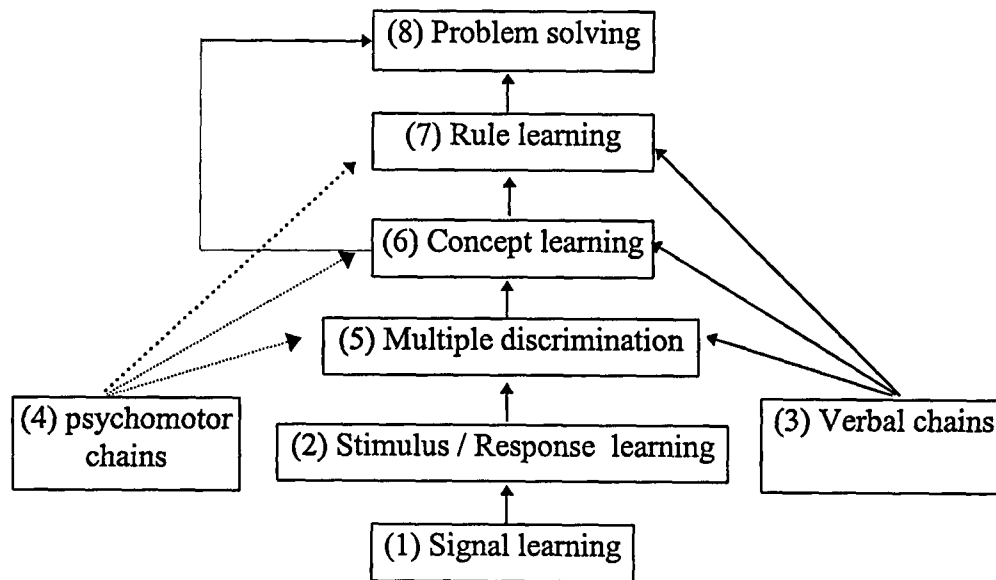


Figure 8: Gange's hierarchy of learning categories. Source: Designing Instructional Systems (Romiszowski, 1981).

The lined arrows should be always be followed while the dotted arrows may be or may not be followed to reach the problem-solving phase. In the 70s Gange put forward a theory of five types of learned capabilities.

1. Intellectual skills learning. which stresses the importance of prerequisites which relate and apply to the new skills to be learned. This develops from discrimination to concepts, rules and higher order rules.
2. Cognitive strategies are the abilities of the student to activate and organise his internal matters such as attendance learning, remembering and thinking.
3. Verbal information learning requiring intellectual skills as prerequisites.
4. Motor skills. which is the performance of physical activities.
5. Attitudes of an individual which is the internal emotional feelings and thoughts that affect his performance.

4.6.3 Bandura's observational learning theory

Simply this states that the human being can learn in a direct way. Man can learn by observing the behaviour actions and experiences of others. Also he can learn in an indirect way by reading books or hearing from others. It is obvious that the desirable results have a great influence more than the undesirable results, which usually are avoided. The observational learning theory is influenced by four phases.

1. Attention phase, it is known that observers learn from models they observe. They will pay attention only to the models that stimulate them.
2. Retention phases, this is the phase where man has to keep the information in his memory. In this phase the information should be codified and classified in the memory.
3. Reproduction phase, training and practice is needed to appear in the learned information in the form of response and action.
4. Motivational process, the results that following a behaviour have their influences in the tendency of occurrence of that particular behaviour. In other words, reinforcement creates expectation and courage, which contradicts with Skinner's explanation.

Bandura states that observers could extract general rules and principles from observed different and various experiences and situations. This is called abstract modelling. Also he believes that the environment of an individual will change according to the way man acts within it and it will influence his behaviour.

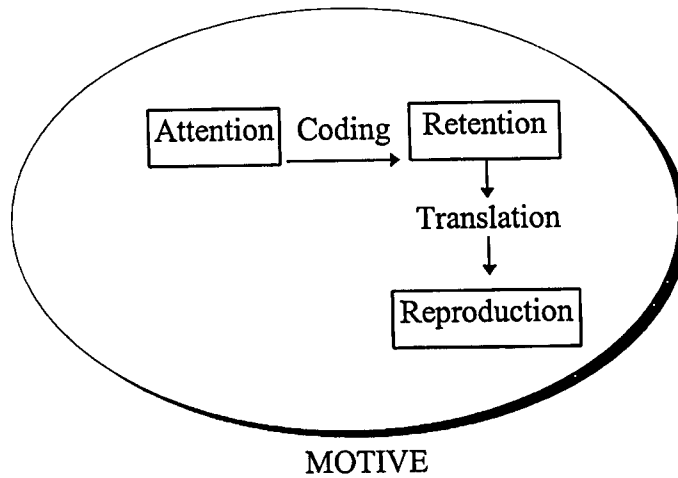


Figure 9: The three phases of the observational learning process. Adapted from Social Learning Theory (Bandura, 1977)

4.6.4 Landa's theory of instruction

The mental activities performed before a problem can be solved are defined as algorithmic and heuristic operations. The learning of problem solving should not only know-how but also when to use suitable, correct and acceptable cognitive skills. Landa gave great attention to these mental activities, and there should be a great care of these mental activities more than the observable behaviour. These mental operations may not be well known to anybody. Therefore, effective instruction must be built upon suitable planning and good analysis. The teacher must know all the details of the mental operations before he can teach. Also the instructions of problem solving should be planned in a way that these mental operations can be checked.

4.6.5 Bruner's free discovery learning

In Bruner's view learning is the way of collecting new information, transferring it to knowledge and the evaluation and acceptance of this information. When an individual overcomes the difficulties and confusion he actively connects things and

effective learning starts, with the individual adding new information to his own knowledge. Bruner adds that the human being learns better when thinking. The intrinsic motive is more important in the long run than the extrinsic stimulation. In other words, student should be allowed to learn what they want to learn in the way they like. They should be given the opportunity to learn problem-solving skills with which they have an interest. In addition, he thinks that education should concentrate more on the unknown and doubtful matters using knowledge as a base. The instruction should be used to activate, maintain and direct the discovery ways.

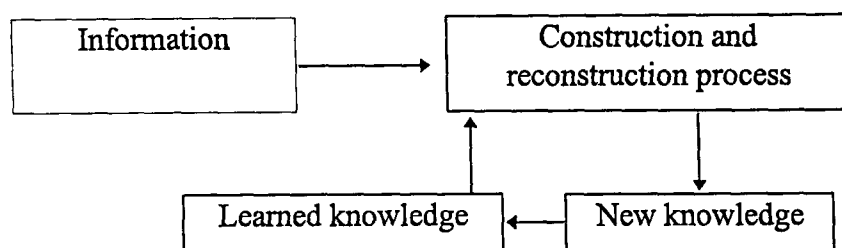


Figure 10: Bruner's model of knowledge acquisition process. Adapted from *Towards a Theory of Instruction* (Bruner, 1966)

Education is progress. Its aim is to help people to improve themselves and to polish their capabilities and attitudes and to have more ability to organise their affairs. Education is not only the pass to tangent, but it is also the key to development. To do this, education has to use all the available tools and means. One of these means is technology. Educational technology occupies a great place in the education process. It gives the teacher new methods and tools to achieve their noble task, in less time and effort with more effectiveness. It provides the students with the information in very simple and easy ways. It is the development, application and evaluation of systems techniques and aids to improve the process of human learning. While the technology of education is to improve the art of teaching and the learning process, the presentation of information by using any means is the field of technology in education.

CHAPTER FIVE

THE TRAINING PROCESS AT THE BGNI AND THE NEW AIDS AND TOOLS FOR TRAINING

5.1 The training methods and aids provided for BGNI

The first development plan of training at the BGNI include training programs for nautical cadets to operate the patrol boats and to do the maintenance operations in the SABG. The plan of training was to provide the appropriate training that required for the different units in SABG. The training plan depended upon the traditional methods for training. It combined classroom lectures with the practical training whether in workshops, or on board by using small boats and sometimes training on board the ship TABUK, which is 60 m in length, 10 m in breadth, with a 2.5m draft and 585 metric tonne in weight. This practical training is usually costly. It requires time, effort, spare parts, maintenance and it is risky, especially for a ship of more than 30 years in service. In workshops, as well as on sea, some training instruments were used, such as magnetic compass, chart, radiotelephone, echo sounder, plotting equipment, and navigation equipment and communication equipment.

5.2 The training schemes adopted at BGNI

The BGNI admits several schemes to provide training for cadets through the studying period that the cadets had to spend in the institute. The plan included several courses but the main and basic courses were:

1. Courses for the new cadets in different subjects: appendix 1 shows a selection of these Courses.
2. Refresher courses for the officers to improve and maintain their qualifications; appendices 3 and 4 show a selection of these Courses.
3. Short courses to upgrade and refresh the BG soldiers knowledge and skills; appendix 2 shows a selection of these Courses.
4. Compulsory courses for the in-service officers in order to keep them in touch with the most advanced technical methods and equipment; appendices 3 and 4 show a selection of these Courses.

5.3 The present situation of the training process at BGNI

The training schemes at the institute are not more than 20 % of the total time. The practical training time is almost completely substituted by the traditional theoretical process. That means most of the trainees miss the opportunity of commencing practical training which makes the development of skills and experiences progress slowly. The oral and written lectures provide the student with a lot of knowledge and information. Therefore practical training is necessary for implementing the theoretical knowledge and information gained by the student. Because of the advanced technology, new assessment approaches must be provided by the institute, in order to make it able to fulfil the national needs and hopes.

5.5 The aids and the tools for training

The training process, as well as the other branches of knowledge, has been subjected to changes in methods and attitudes. Due to advanced technology much equipment is used in the training operation, such as the computer. A quick look at the training process, the effect of the new advanced technical equipment, and the progress of the technical methods and ideas which are applied in most of the naval institutes, will

illustrate the role that the computer is playing in the training process. “ What is meant by the word training? The following definition provides an insight. The systematic development of the skill behaviour pattern required by an individual in order to perform adequately a given task or job.” (Muirhead. March 1998).

In order to perform the task or job in a good and acceptable way, the individual must be trained and live the real life situations of the required task or job. This training gives him the capability to develop his skills and self-confidence in making decisions. Maritime training is always costly. Sometimes it is risky, in some emergency situations, for human lives. It needs much time and effort. But the new advanced equipment such as the computer, now can provide us with similar situations and through feedback, results can be obtained. Figure 11 illustrates the elements that should be available to get the best results of such training.

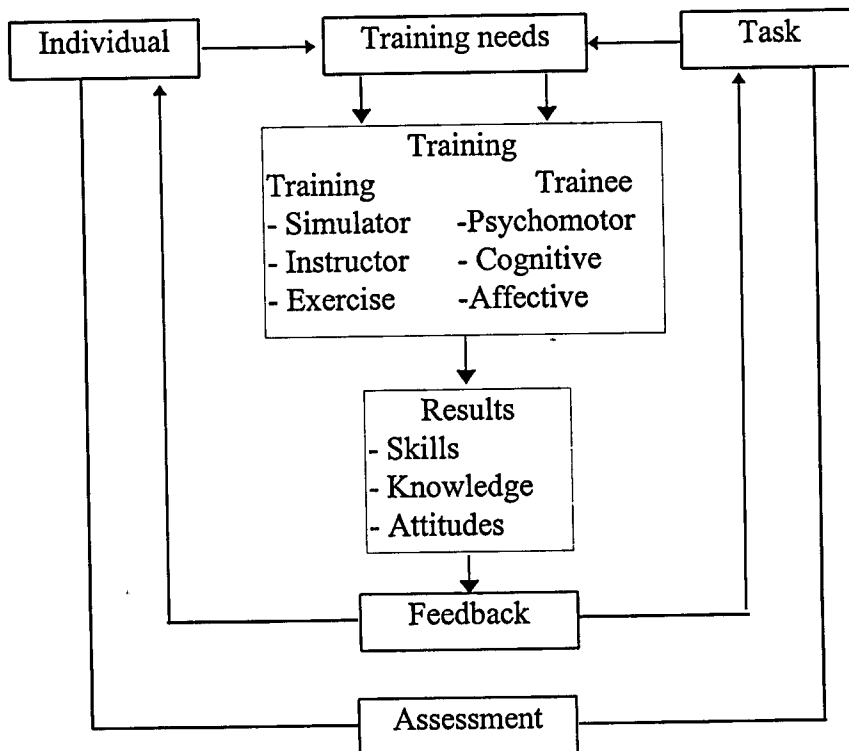


Figure 11 Illustrates the elements of simulator training (Source SUSAN Hamburg).

To simulate a situation a computer must be used to design a computer programme and re-operated by the computer to give a simulation case. A simulator is a training tool, which should act with the whole programme. In other words, a simulator should be used for training of normal and emergency situations. This can be done without putting the trainees and environment in dangerous or critical positions. This programme can be done in different modes. Four elements are involved as an intensive interaction.

1. Simulator equipment.
2. Training programmes.
3. Student.
4. Instructor

Figure 12 illustrates the four elements which depend upon each other and any changes for one will affect the potential use of the others. Further the four elements should be considered in relation to each other and not separately.

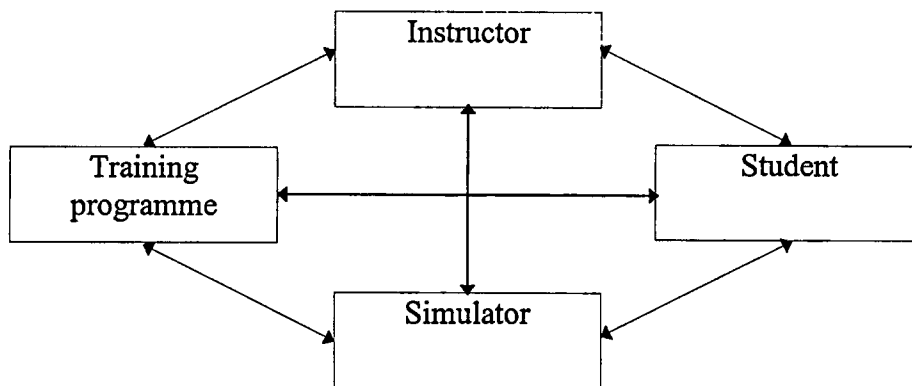


Figure 12 Illustrates the interactive elements

Also the basic elements in the man-machine communication will be considered as methods for developing scenarios or exercises. Further investigations into the design of training scenarios can justify the division of certain areas of training into five basic types.

1. Team training
2. Operator training.
3. Decision training.
4. Procedure training.
5. Maintenance training.

5.6 Evaluation of training

One of the definitions of the word evaluation is any try to obtain information on the effects of a training programme and to assess the value of the training according to the obtained information. Evaluation of training is very important to any training programme. A special consideration should be given to the various elements in any evaluation attempt.

1. The instructor acts.
2. The trainees act before and after the exercise.
3. The information and effect of the training programme.

5.7 The procedure to evaluate a programme

Four steps should be taken in any evaluation attempt. These steps are as follows:

1. Reaction

This is the satisfaction of the student, and how well the student liked the programme. Usually it depends upon the feeling of the student and not how much was learnt. The student's opinion is influenced with other factors. Some guidelines for evaluating reaction are mentioned below.

- a) Determine what you want to find out.
- b) Use a written comment sheet.

- c) The design of the sheet to be arranged so that reactions can be tabulated and quantified.
- d) Obtain honest reactions by making the forms anonymous.
- e) Encourage the student to add any comments which is not included in the initial questions.

2. Learning

Learning means the process by which attitudes were changed and knowledge and skills were achieved. A very careful analysis should be made, because a favourable reaction does not mean learning. The way of presentation is sometimes well accepted, which does not mean it has a value. Some guidelines are used to evaluate the term learning.

- a) The learning of each student should be measured so that quantitative results can be determined.
- b) An approach before and after must be reached so that any learning can be related to the training programme.
- c) Where practical, the evaluation results should be analysed statistically, so that learning can be improved. In terms of correction or level of confidence.

In the maritime field new emphasis has been placed on the evaluation of learning by means of the assessment of competence decided in the STCW 95.

3. Behaviour

Behaviour is what changes in job behaviour resulting from the training programme. This would not occur without the following features.

- a) Desire to change.
- b) To have knowledge how of what to do and how to do it.
- c) Assistance in applying the classroom learning.
- d) Rewards for changing behaviour.

e) The right job climate. This one is very important because if there is no encouragement no changes in behaviour will happen even if the student has the necessary knowledge, skill and desire.

4. Results

To evaluate a programme by results is very difficult, because so many complicated factors exist. Sometimes the objectives of the programme are stated as results, which is not true. It is better to evaluate it in terms of desired results. It is better evaluation to be done first in terms of reactions, learning, and behaviour and afterwards by terms of results.

5.8 Evaluation of the instructor

In the teaching and training process, the evaluation of the staff should be on the top of the evaluation priority list, although sometimes this evaluation does not take place due to its sensitivity. As to the simulator instructor some form of evaluation of staff is applied, some additional evaluation items should be added according to the group and categories of simulation system. The following evaluation items can be used in general.

1. Ability to develop an exercise.
2. Ability to conduct a training session.
3. Ability to transfer concepts and knowledge.
4. Ability to utilise various teaching techniques effectively.
5. Ability to monitor and supervise trainees.
6. Ability to provide proper briefing and debriefing information.
7. Ability to identify students requiring extra guidance.
8. Ability to motivate the trainees.
9. Ability to create the right learning atmosphere.
10. Ability to perform training sessions in a professional way.

5.9 Instructor qualifications

1. General knowledge

Studies have found that the impact of the correct type of instructor and his attitude towards the trainees is of vital importance. The instructor must own the same or higher qualifications as the trainees. The instructor who owns higher qualification is better in evaluation. The instructor, as well as the trainees, is not expected to answer every question. He will lose credibility if he is not able to answer any question or all. The trainees often try to show a vast amount of experience and then it becomes vital for the instructor to have some over weight of his own to make an equilibrium. Many factors will influence the process so the instructor must be always able to see the sensitive balance.

2. Subject-related knowledge

The instructor must have the ability to get the message across properly with all the small nuances involved as the training course reaches higher levels. It would be difficult to the training process to find instructors who are handling the same diplomas as the trainees. Such instructor must take care in dealing with the trainees, in order to avoid unnecessary critical situations.

3. Experience

Experience is a very important term for the instructor. His previous experience enables him to own the skills to organise his lessons, and to deal with the simulator equipment. The simulator staff, without previous experience, would be a great risk for the whole effort of the training process. The instructor must have the capability to organise and conduct a briefing session before the exercise. He has to prepare his concepts, and to explain it in an understandable language and to supervise the trainees during the exercise in a very active manner. He has to communicate with the trainees and provide them with his comments and discuss what they have to do

during the training. He has to understand the trainee's background, culture, personality, and age and to deal with it in a sensitive manner.

4. Motivation

The instructor must have a belief in the programme and the instructions so that the trainees will take them seriously. He must feel the importance of the training and reflects this to the student. Sometimes the over experience of the instructor leads him to forget this item, as there is no more real competition in the profession. This situation will effect his efforts negatively. Also, the over acting motivation will be soon be recognised by the trainees. Then they will become careless and they will act in the opposite way, with out any motive.

5.10 The tools for the training process

The most effective equipment presented by the new technology for the training process is the computer. By using this equipment the real life situations can be replaced by similar virtual situations. The most popular mode for the training process the is simulator. This mode would be difficult to be applied and operated without a computer with a large storage capacity. The nocturnal display and the Computer-Generated Image (CGI) visual display are the most used types of simulator. The first type because of its simplicity and its low cost; it is favourable for training purposes. The second type because it has the ability to create a large number of visual data which are controlled digitally by a computer.

5.11 Categories of simulators

The classification of the categories depend upon the workload, the number of the persons that are going to use it and the location of application. The part and single task simulator is a facility that can simulate a single ships, or a limited combination

of tasks, relating to a system. Then the full mission simulator, which gives the opportunity to the trainee to show how much he can do. In this way a real measurement for the acquisition of skills can be made, because any mistake done would be to increase the difficulty of the exercise.

5.12 The use of personal computer simulators

Progress in computer technology is providing the personal computer (PC) with an increased power of computer processors. This technology supplies the PC with a very big storage memory of Gega bytes. This gives the computer the ability to store a large quantity of situations. Single ship system or a set of operations can be operated in an interaction with the trainee by using the keyboard. Microprocessors provide a multimedia features (figures, colours, sound photos, animation, etc.). No doubt the new microprocessors provide the computer with the power to extend the simulator capabilities. Due to this the use of the PC has increased more and more. It becomes a training aid to the students. They can use it at their own convenient time and anywhere they like. Many functions satisfy the trainees such as correction of errors and mistakes and repetition of situations. This allows the trainees and the instructors to replay, clarify and discuss the training exercise during debriefings; also to repeat the exercise if they want to.

The PC use of Engine Room Simulator (ERS) and Port Task Simulator (PTS) gives the trainee the opportunity to be involved and get the motive to learn. Simulators also provide a facility for the development of skills that can be developed alone in private places, and they can learn the correcting of mistakes.

CHAPTER SIX

THE NEW TECHNOLOGY FOR STABLE MANAGEMENT

The management of a MET institution is different from one country to another. Some institutions are managed as an independent organisation. In this case the decision is made by the administrative department of the institution, without any exterior interference. The institution must have its own financial resources. While other institutions are managed by polytechnic universities, or by the government, in this case the administration departments are connected to higher management. Whether it is a decentralised or centralised system the administration and management system of the institution will be effected by the central policies and directions. The decentralised system works within the circle of the central system. In decentralised management system the institution must have a clear objectives that lead it to fulfil the policies and directions without any disturbance in the educational process.

6.1 The management of BGNI

As mentioned in chapter three, the BGNI is managed by the Saudi Government with the Interior Ministry involved in its management and administration. The management of the BGNI is under the management of the General department of Border Guard, which is one of several departments included in the Interior Ministry. The skeleton management system of the institution consists of several departments with an officer in charge of each department. Each department has different

divisions and each division has its tasks to complete. All the departments are under the command of the chief officer and his deputy officer.

The institution has been provided with a communication network controlled by a computer. This communication network, unfortunately, is not used to the full potential to let information flow from and to the different divisions of the several departments of the BGNI. Merely it is used as a typing and printing system. It is neglected for documents and information storage. Up till now documents and information are kept in traditional ways. Archives and files are mainly used.

The decision making process, based upon the divisions' decisions are submitted to the higher departments and officers. The management of the institution is a decentralised system within a centralised system. This is good, but the difficulty of exchanging information in an easy and fast way delays and leads to wrong decisions. This affects negatively the administration and management operation, and it leads sometimes to corruption in the management due to the lack of information. This information will enable the responsible higher officers to take the proper and necessary decisions in time.

6.2 Information technology

The easy and fast information flow between the different users is the most important factor in management process. The importance of information flow between the different users will be a prerequisite of the new management system. The development of information technology makes it possible and at a low cost so that institutions may have their own computer-based systems for administration and management operations. The local management of any institution is in need of a form of computerised and administration and management system, not just to reduce the workload, but also to help in the making of proper decisions.

The development of computer technology makes it possible to control the administration and management process. Computers with large capacity storage will be able to keep the information need. Spreadsheets and databases are needed to supply information to the users to enable them to convey the problem and take action. The traditional educational organisation focuses on the courses and the regulations of acceptance to match the financial resources and the policy pressure. They usually forget to evaluate their actions and their output. Such organisations need a reform plan in the management. To make a reform in management means new ways to get, keep and provide information. The proper information will lead to the evaluation of actions. They will be able to admit the policy and priorities which can be achieved within the resources they have. Good management can propose plans referred to in a strategic plan.

6.3 The role of communication in management

Management depends upon information. To get information at the proper time and in the proper place, it needs a good and reliable communication means. The importance of internal communication has been taken in consideration of the management and administration operation. Maritime institutions work as an open system. They are in need of outside information. They must find a way of communication to import this information, either to keep it and to use it later, or to solve an immediate problem. Personal contact can be one way of communication by which the institution can get information. Proper managed conferences, visitor lecturers and meetings will be an effective communication way, where everybody tries to get as much as he can from others. Telecommunication now plays the master role in exchanging information between users. Telecommunication is essential in any management and administration system. It can carry the information to any place at any time according to the user's convenience. The advance technology can make leakage way in the telecommunication channel. Other parties can listen and

discover secrets. So in order to keep the valuable information secret, great care should be paid in choosing the channel and the system of telecommunication. Information can be obtained through the Internet.

The internal communication for any organisation can be done either by personal means or by telecommunication. Both ways can be used to provide verbal and written information, and further, both ways can keep and exchange documentary information. The computer has an important role in controlling and arranging communication methods.

6.4 Towards successful management

Although the practice of management depends upon experience and common sense, it also needs a scientific study to identify the best ways to perform the task. There are some functions which should be available to get the results of the administrative management of the whole organisation. These functions are:

1. Planning; which is the process of developing tasks to be done and the ways to do them.
2. Organising; which is the skeleton structure of authority through which the job is arranged, defined and co-ordinated to do the job.
3. Staffing; which concerns the personal function of selecting, training and providing favourable working conditions.
4. Co-ordinating; which concerns the efforts needed to support each other to achieve a common goal.
5. Reporting; which puts on record all the research and inspection of the progress of the work, and testifies any thing happens, and keeps the responsible chief informed to make him able to rectify any mistakes.

6. Budgeting; which is the control of expenses, and keeping the work within the budget.

6.5 Management without the computer

The system computer managed instruction presents an administrative support to the instructors for managing instructional materials and activities. The computer is a very useful tool in management. It can be used everywhere to save time and to help the user to manage large amounts of information in an efficient and effective way. The analysis capability of the computer provides the user with easy and simple information. All the activities in management operation could not be under control without the computer. The administrative management of an organisation today would be useless without the computer. Mismanagement, corruption, and disturbance in decision making would be the common feature without the use of the computer in management operations.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

Maritime education, as other branches of knowledge, is gained by study and achieved by training. The quality of the graduated individuals depends on the teaching and learning systems and tools used. The advanced maritime institutes provide the students with the most advanced tools, equipment and vehicles to help them in the learning process. Advanced computer technology is used as an aid in the teaching and learning process. Both computer assisted learning and computer assisted training are used to full capacity at these advanced maritime institutes. These have given remarkable results. Also the computer in the management process is used to provide students with all the necessary information and a suitable environment. The control operation in any good management system is very important item. It gives the motivation to follow discipline and order. It helps to organise and arrange the way of collecting information.

For thirty five years ago educators have used computer for instructional purposes. In the 60s the educational computer was used at large universities for the purpose of reading and typing. Computer learning programmes were used to do develop instructional materials.

The invention of the microcomputer at the end of the 70s led to the use of the computer in businesses, schools, hospitals, airports and houses. It was provided with greater power and ease of use through advanced visual and auditory devices; also

many microcomputers could share information and resources. With all of these advances there was a steady decrease in the cost of computer units.

The release of the microcomputer, and later personal computers, from different companies with many changes, provided better integration of text and graphics, better voice and music capability. Besides the typing device as an input, it was provided with a mouse for pointing at the screen.

At the end of the 80s, the latest generation of microcomputers was released. Its features were greater speed, storage capability, networking potential, multitasking and flexibility.

To take advantage of the computer's particular capabilities and not to waste them, computer based instructions to do so in situations where the computer is likely to be beneficial. Those situations are where the cost of instruction by other methods is costly (for example in onboard training), where safety is a concern (as in dangerous tasks), where the subject is very hard to teach by other methods (for example navigation), and where extensive individual student practice is needed (for example foreign language). In order to make sure that the advantages are gained by the student, high quality and creative instructional design, coupled with careful evaluation and revision, are necessary.

Some of the methodologies that are demonstrated in Chapter Four will provide the basic ground needed for understanding and developing good computer based instructions. These methodologies were guided by several issues in cognitive psychology. The areas of cognitive theory are most important in computer based instructions, as they are those relating to perception and attention, memory, comprehension, active learning, motivation, locus of control, transfer of learning and individual differences. This short list of issues is the best way to summarise what is

important in education and the design of computer based instructions. Some cognitive psychology theories were also demonstrated in the same chapter.

Through the previous chapters a close look at the BGNI was taken. In Chapter Two historical events were written since the establishment of the SABG and the establishment of the BGNI up till the present time. The present situation, with respect to the three operations CAL, CAT; and CAM, of the BGNI is illustrated in Chapter Four, Five and Six.

In the last thirty years, BGNI admitted development plans and new systems to improve the maritime education and training. The required goals of these development plans were not achieved. BGNI tried hard to handle these problems by increasing the courses and the attendance time. A highly qualified staff, in order to achieve the improvements was sought. This effort gave some results, but not up to the required level. In the author's opinion, any development plans will be a waste of time and effort without the admission of the use of the computer in the three operations at BGNI.

The use of the computer can handle all of the above three operations. It could be proof of efficiency in CAL, CAT and CAM. These three operations are very important for the development and advance in maritime education and training at BGNI. The computer could offer more information than the traditional ways could do. It will save time and effort which are precious factors in the growth of all countries.

Any future plans to improve and develop maritime education and training at BGNI should pay great care to computer literacy. The features of this plan, in the author's opinion, must be as follows:

1. With respect to computer assisted learning, the following features are recommended.
 - a) Computers should be used by both the teachers and the students. The teachers have to use the computer to reduce the routine of administrative work, such as grading, producing assignments and handouts, writing letters, and keeping track of the resources and materials. When the computer could perform or speed up such tasks, the teacher would have more time to work with the students. Also the computer could help the teacher in presenting new information, by using the *power point* program for example. To teach skills teachers could model the skills to be learned. By tracing the students progress teachers could recommend programmes according to the education level of student understanding (in simple or complicated modes). The students have to use the computer at their convenience to get more information and increase their knowledge. Their satisfaction should be directly rewarded and their mistakes be corrected.
 - b) An entrance exam at the primary level in usage of the computer and its literacy should be applied to evaluate the students' computer knowledge.
 - c) An intensive course should be held to strengthen the students' capability of using the computer.
 - d) Computer program should be carefully chosen; serious evaluation of each programme should be made in order to decide its advantages and how much the student could gain from it. (refer to 5.7)
 - e) To get in touch with the computer manufacturing companies in order to purchase the most durable computers of high capabilities.
 - f) BGNI should include in the purchase order a clause which states that the supplier should send advisors and instructors of high qualifications to teach the staff the necessary operation procedures of these computers.
 - g) BGNI has to arrange regular visits to the program developers to keep in touch with the advanced program, also to encourage the positive response and to eliminate the negative ones in any programme.

- h) BGNI has to call annually for conferences and exhibitions with intensive advertising announcements in the newspapers and TV. In order to give the opportunity to the school students to learn about the computer and what the computer can do, to encourage the students from all levels to be familiar with the computer through such exhibitions.
- i) To make use of the recommendations of the conferences, and to invite visitors to lecture at the institute.
- j) The methodologies of the computer should be understood very well, and its applications are very important to encourage computer education and training.
- k) The cognitive psychology should be observed and noticed by the staff to encourage the positive actions and reactions of the students, to diagnose the negative ones and describe the proper treatment procedures.
- l) The exchange of the information flow in simple and easy ways, so that the students can benefit from this information. Also the staff can get this information to remedy actions at once. This can be done by providing a computer net connected to all the departments and sections of the institute. It is better if this net is connected to the internet.
- m) BGNI should provide the proper environment to help the student memorise, and learn new information and get new skills. This could be achieved as follows:
 - I. The information should be available whenever and wherever the student prefers.
 - II. No stress in the teaching process.
 - III. To give the students the opportunity to express themselves and their skills without fear.
 - IV. To encourage the motivation of students.
 - V. The students should not be ashamed of discussing any new information.
 - VI. To explain to the students that there is no need to worry about the changes, and every change is not necessarily bad. This would help them to be active and they will work to get the information.

n) Special classrooms should be available at BGNI. Every classroom should include a number of computer machines so that the teacher can supervise every one. In the author's opinion, a classroom with thirty computer machines would be an exhausting method for the teacher, and the students could not gain much without the guidance of the teacher.

2. In addition, to the above, the author recommends the use of computer assisted training as follows:

- a) BGNI should show more interest in importing computers for the training process, such as simulators.
- b) BGNI has to admit computer training programmes after a serious and careful evaluation.
- c) BGNI has to choose qualified instructors; the suppliers of the computer machines must send instructors with very high qualifications to operate these machines for some time, also they have to teach a chosen staff of high computer literacy.
- d) The training time should be respected, completed and not replaced by another subject.
- e) An interval investigation and evaluation of the staff, program, computer machines and the students should be accomplished.
- f) A high penalty to be applied, if the suppliers, fail or delay in the maintenance of the computer machines.

The procedure of the above evaluation for the staff, program, instructors and students was demonstrated in Chapter five.

3. In addition, to the above, the author recommends the following steps in order to improve the management process.

- a) Administrative qualified staff to handle the management operations.

- b) The computer should be used to keep files, letters, orders and circulars. These computer machines to be connected to the main net. The communication and exchange of information would be faster and easier.
- c) To choose proper and advance net to exchange the information. Microwave senders and receivers connected to the computer would be of great advantage, specially that the institute consists of separated buildings.
- d) A very complicated and secret net should link the institute with the head quarter, other region, departments and sections of the border guard divisions. Through this complicated and secret net, confidential information can be exchanged in order to avoid the tracking .
- e) A password should be given to the members according to their ranks to access to the net, This password should allow the user to the access of a specific level of information.
- f) To modernise the present net and not to be used only as a typewriter and printer, it should keep all the required information about the staff and the students, it should handle all the supply operations. The control of the library operations to be controlled by using computer.
- g) BGNI should use the computer for planning, organising, co-ordinating, budgeting, and reporting. All of this needs time and effort, but the use of computer will save all of that. A computer programme like spread sheet will do all of that, and the required information could be got in a very short time.
- h) Interval visits of the editors to be considered, in order to control and evaluate the management process at the BGNI.

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Appendices

Appendix 1

Selected some courses for newly admitted students at the Border Guard Naval Institute

Course	Subject	Aim	students background
Basic navigation course	Physics, Mathematics, Fire fighting and prevention, Electronic Navigation aids, celestial Navigation, coastal Navigation, Meteorology, English language, practical training on board vessel 'TABUK'	To acquire the knowledge and skill to work in the navigation divisions on board Boarder Guard crafts.	The candidate most have completed the Naval qualifying course and have the secondary school certificate.
Deck hand course	Fire fighting and prevention, English language, Nautical terms, ship systems, Rope work techniques, Anchor work, Manoeuvring and steering, Ship maintenance, practical training on board vessel 'TABUK'	To acquire the knowledge and skill to work in the capacity of an efficient dockhand on board Border Guard crafts.	The candidate most have completed the naval qualifying course and have the primary school certificate.

Appendix 1 continued

<p>Communication technician course</p>	<p>Fire fighting and prevention, English language, safe working practice, visual Communication, Radio Communication, Wireless instruments, Radio Communication propagation and the ionosphere Communication systems, Physics, Mathematics,</p>	<p>To acquire the knowledge and skill to work in the Communication divisions on board Boarder Guard craft.</p>	<p>The candidate must have completed the Naval qualifying course and have at least the secondary school certificate.</p>
<p>Instructors and trainers course</p>	<p>Educational psychology, Military psychology, Physical education, Social psychology, education management, Teaching and training methodology, Teaching and training aids and technology, practical teaching application</p>	<p>To be able to educate and train the BGNI graduates on acquiring the required social psychological and technical principles to qualify for duties and training</p>	<p>To have an instructor's potential and attitude, have completed a speciality course, scientifically qualified for teaching the BGNI educational programs. In addition, the candidate holds at least an elementary school certificate. However, a primary, secondary school certificate, high technical college certificate or University degree determines which course and level the student instructor can pursue.</p>

Appendix 2

Selected short courses to upgrade and refresh the Border Guard soldier's knowledge and skill programs

Course	Subject	Aim	students background
Naval qualifying course	Physics, Mathematics, Safety Aspects, Fire fighting and prevention, Communication, Seamanship techniques, Electrical Engineering, Electronic Engineering, Mechanical, English language.	To let the student acquire the required skill working in the marine stream at the Border Guard.	The candidate has at least completed the elementary school education and the military qualifying course.
Electronics technician qualifying course	Communication Engineering principles, Radar technical principles, Radar Equipment's, Radio Equipment's, Practical training.	To qualify the graduates from technical school or high technical colleges for technical duties (operation, maintenance and repair) of electronic equipment and installation	The candidate most have completed the naval qualifying course and hold a technical secondary school certificate or high technical colleges speciality (electronics)

Appendix 2 continued

<p align="center">Supply technician qualifying course</p>	<p>Warehouse management, Governmental Warehouse Regulations and procedures, Warehouse supervision, office work practical training on board vessel 'TABUK'.</p>	<p>To qualify the graduates from technical school or high technical colleges for supply management duties</p>	<p>The candidate must have completed the naval qualifying course and hold the technical secondary school certificate or high technical colleges certificate.</p>
<p align="center">Search and Rescue technician qualifying course</p>	<p>Communication and Diving principles, Rescue and first aid principles, practical training on board vessel 'TABUK'.</p>	<p>To enable the student to acquire Search and Rescue principles together with recovery of victims</p>	<p>The candidate must have completed the naval qualifying course and hold the technical secondary school certificate or high technical colleges certificate and have passed the physical fitness exam and swimming.</p>

Appendix 3

Selected courses for Border Guard officer's Education and Training Programs

Course	Subject	Aim	students background
Naval officers competency course	Boarder Security System, Boarder Guards crafts and their equipment, Rules of the Road, Search and Rescue,	Qualifying officers to work in the BG and identification of BG duties and various districts.	Holding a BSc in maritime science degree.
Basic Naval course for University graduations	Maritime Safety, Fire fighting and prevention, Seaman ship techniques, Navigation, Communications, Electrical Engineering, Mechanical Engineering, Electronic Engineering,	To allow the student to acquire the minimum requirement concerning the various specialisation's of life at sea and informational background to acquire basic naval skills.	Candidate officer as a University graduate and have completed the military qualifying course.

Appendix 3 continued

<p>Executive officers Basic Course</p>	<p>Mechanical Engineering principles, Electrical Engineering principles, Electronic Navigation Aids principles of operation, Rules of the Road, Electronic Navigation Aids operation, Fire fighting and prevention, Manoeuvring, Coastal navigation and chart work, Celestial Navigation, Communications.</p>	<p>To qualify the student for the watch keeping course.</p>	<p>Hold a BSc marine science and have successfully completed the naval officers' competency course</p>
<p>Mechanical Engineering officers basic course</p>	<p>Introduction to operation Research, Fire fighting and prevention, Work shop skills, Mechanical Engineering principles, Ship construction and stability, Propulsion and steering systems, Ship machinery, Cooling and Refrigeration, Internal combustion Engines.</p>	<p>To enrich the student's skills and information required for the engineering stream to run and supervise the operation of marine main and auxiliary machinery. Also, to be qualified for training engineering technicians.</p>	<p>Hold a BSc in Mechanical engineering or technical diploma in Mechanical engineering or its equivalent and have completed the naval officers' competency course and the Basic Naval course for University graduates.</p>

Appendix 3 continued

<p>Electrical Engineering officers basic course</p>	<p>Introduction to operation Research, Fire fighting and prevention, Work shop skills, Electrical Engineering principles, Electronic circuits industrial principles, Electrical power supply, Electrical control systems, Navigation and Communications systems, Electrical Equipment.</p>	<p>To increase the student's skill and information required for electrical engineering duties, maintenance and supervision of technicians. Also, to acquire the ability to train student technicians.</p>	<p>Holding a BSc in Electrical engineering or technical Diploma in Electrical engineering or its equivalent and completed the Naval officers competency course and the Basic Naval course for University graduates</p>
<p>Executive officers watch keeping course</p>	<p>Mechanical, Electricity, Electronics, Fire fighting and prevention, seamanship, Navigation, sailing.</p>	<p>To provide the officer with the required skills for manoeuvring, watch keeping at sea and in port.</p>	<p>The candidate must have completed the Executive Officers Basic Course</p>

Appendix 4

Selected course for Border Guard officers special Education and Training Programs

Course	Subject	Aim	students background
Hovercraft course	Seamanship techniques (with emphasis on Hovercraft operation), Rules of the Road, Electronic Navigation aids, celestial Navigation, coastal Navigation, Hovercraft construction and stability, Hovercraft's safety equipment, Hovercraft's Mechanical principles, Hovercraft's electrical principles, Hovercraft's operational practical training.	To qualify naval officers to command and control a hovercraft on land and at sea	The candidate must have completed the Executive Officers' Basic Course and watch keeping course
Search and Rescue course	Weather forecasting and Meteorological Equipment, Accidents and first aid education and training, Rules of the Road , SOLAS'74 convention, Communication, Manoeuvres, Navigation and Rescue.	To acquire the ability for marine search and rescue by positively using all available human and technical resources and to respect and act within the international legal framework	The candidate must have completed the watch keeping course

Appendix 4 continued

Offices Diving Course	Accidents and first aid education and training, Marine Environment, Swimming and physical fitness, Diving Equipment, Diving skills and underwater Search and recovery, Practical training.	To make the student acquire the ability of underwater search and rescue by using all available human and technical resources, to work at the marine search and rescue centres.	The candidate must have completed the Executive Officers' Basic Course and be physically fit for diving
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Note:

Appendices 1, 2, 3 and 4 include selected subjects excluding common subjects such as: Kuraan, Islamic education, leadership, physical education, education on drug abuse dangers, casualty investigation, weapon usage education and training, swimming, field training and sailing voyages