CHANGING LEARNING ENVIRONMENT

A FUTURISTIC IDEOLOGY ON MARITIME TRAINING METHODS

Captain R.Janardhanan MICS, FNI

Lecturer, Maritime R & D, Singapore Maritime Academy

In today's ever-changing world – Information technology and computers have become part and parcel of everyday life. Computers invaded the marine sector in the early and mid 80's and in the last couple of decades, seafarers have grown tremendously dependent on these machines. With every passing year more and more electronic equipment are being fitted on board ships with the intention to enhance the automation of ship-board functions with an aim to reduce the number of staff on board. This requires that staffs on board are well trained and adept in the use of computers not only in their basic operation but also to use this electronic resource to its maximum extent.

Is this the answer to reduce Maritime Accidents at Sea???

Learning environment is continuously evolving and it is all the more important to change the present ***"Teacher centered methods"*** *to* ***"Student centered methods"***

This paper will discuss the pro's and con's of conventional classroom training and training methods using IT and also compare and contrast both. This paper will also discuss various methods of training available using IT and simulation and also compare the Marine Industry with the rest in advancement of computer technology.

This paper will discuss "How simulation can reduce accidents at sea" giving some examples.

A general overview of SMA's Research and Development department showing projects completed and projects under progress along with futuristic views of like minded professionals.

INTRODUCTION:

Learning is changing and so are methods of training and learning environment.

Computers and computing skills have been instrumental in accelerating the change in the learning environment. The use of Internet is growing at a rapid pace and with

growing technology the dial up access is being replaced by the Broadband, which is not uncommon today. To illustrate the power of broadband and Internet today – the entire USA Library of Congress could be transferred in just 7 seconds. The modern ship today is by itself a floating computer centre with all the computers on board networked using either a LAN / Intranet. Communications to and from the ship are still expensive using satellites and broadband 24 hour internet connection on board a ship may still be some time away. They are probably only available on Cruise ships as access to passengers – where as they are still not economically viable on cargo ships. When compared to land, we are still unable to use this fantastic resource of INTERNET to the fullest at sea. Technology is changing by the minute, specially in the field of communication and information technology. By the time one understands the facts and figures of a particular system and before you could conclude whether you require the system or not – it has already become outdated. To keep pace with this rapidly changing technology – Training methods and learning environment needs to change almost at the same pace. Most of the words we hear these days has a prefix 'e' like e-commerce, e-learning, e-business, etc and the commonly used training terms 'Anytime, Anywhere, Anyone', 'Just in time', 'Performance Support system' etc are increasingly becoming part of anyone's training directory.

THE LEARNING PROCESS:

Learning involves acquisition of knowledge to greater or lesser degree depending on what is to be learned. Knowledge by itself is not enough unless the learners understand how to use it. Without thinking about what we are learning, and understanding it, much of the knowledge we have memorised is of little use and is most likely to be forgotten quite quickly. We tend to focus our efforts on learning new skills to be able to perform an activity within an occupation or a given function successfully –

thus developing our competence. ***Competency can be described as a combination of knowledge based, skill based and attitudinal aspects as it can be observed during human performance during task situations.***

THE CHANGING LEARNING ENVIRONMENT:

The traditional source of learning has been colleges and universities. Most of these icons of learning provided knowledge in a typical class room environment, with little or no focus on imparting skills and behavioural attitude. The idea behind this environment was that skills and attitudes needs to be gained and cannot be imparted. The colleges and universities provided the content, the subject matter expertise, the instructors/ lecturers, the library resources, assessment and certification processes. The process was basically "teacher centred method" which was some a of a one-way communication.

The focus of learning has since changed. Today the need to impart skill and practical based training along with knowledge seems to make "TRAINING COMPLETE". With Globalisation and concept of "CITIZEN OF THE WORLD" – it is all the more important that the modern day student has an access to what ever he wants – whenever and wherever he needs. The focus on training is changing from **"Teacher Centred Method"** to **"Student Centred Methods"**.

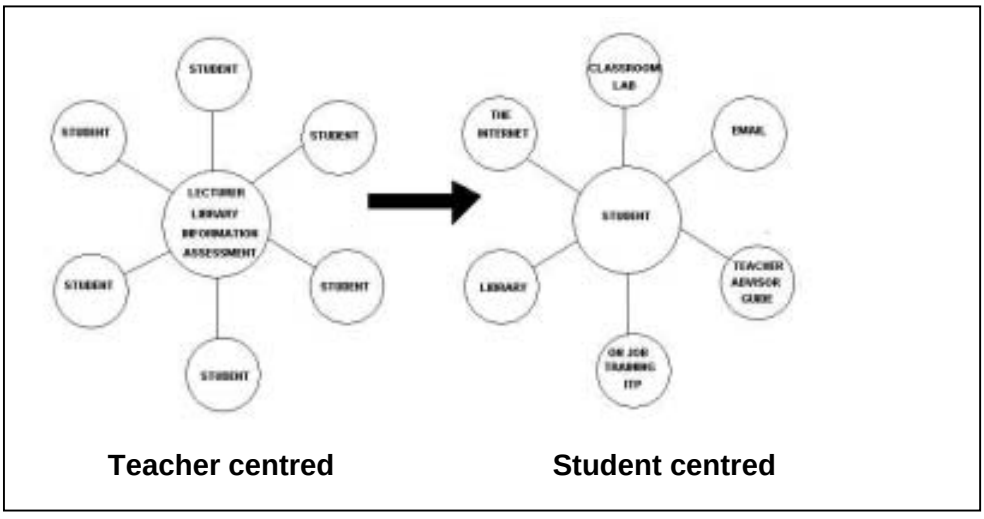

Figure 1: Changing Learning Environment

Information outflow has vastly increased over a period of years. A modern student in the year 2000 is exposed to more new data in a year than his grand parents encountered in their lifetime. It is said knowledge doubles every 7 years and about ten thousand scientific articles are published every day. There is a need for changing the system from our long standing educational practices to preferred educational practices as outlined by Jostens Leaning Education Forum which is shown below.

Long standing Educational Practices	***Preferred Educational Practices***
Teachers lecture; student listen	*Teachers guide, coach, motivate and facilitate. Students are active "doers" – presenting, analysing, solving, constructing.*
Working as an individual is prized. Working together is discouraged and even disparaged as "cheating"	*Working together is prized because it emulates the way people work most often in real life, within a team. Individual work is given less importance.*
Content is balkanised into "subjects' that are treated without much connection to other subjects. Students have no clear idea of relationships between subjects such as history and science.	*Subjects are usually integrated, to provide different perspectives on skills and issues, assist in solving problems, or help students relate their interest in one subject to another.*
The curriculum is fact-centered. Students often memorize facts and concepts in isolation from the real world and from other subjects.	*The curriculum is problem-centered. Students engage in tasks related to the real world in which they must collect and assess information to solve problems.*
Teachers are regarded as the primary source of knowledge	*There are many rich resources for learning. Teachers help students access and interpret many sources, including traditional print materials, the Internet, online lessons, and dialog with experts.*
Second only to the teacher's words, print media are the primary means of communication; "reading and writing" are the essence of the curriculum.	*There are simple opportunities to explore concepts using a variety of media – video graphics, sound and speech, as well as print. Students not only master reading and writing but also gain experience in other media and in "multimedia".*
Student success most frequently is presumed when students remember what teachers and books say and can report back.	*Student success most frequently is presumed when students solve problems, communicate ideas, present information, and learn how to learn.*
Schools are insular, largely separated from the rest of the community	*Learning is everybody's business and takes place throughout the community. Computers connect the world to the classroom and the classroom to the world.*

Josten Learning. 1995, http://www.jlc.com/edures/teachers/edforum.html

Table 1: Long standing v/s Preferred educational practices

From the above it is quite evident that the learning environment is set for a rapid change. The question arises here is "Are we fully equipped and ready to accept the change?"

Computers and computer related technology has been a great catalyst in changing the learning environment. Today Information Technology is considered as another added competency in any work environment. A survey on the use of Information Technology indicated that in the year 1996 – 65% of IT was used in some form or the other within jobs increasing to almost 95% of work related environment using IT in the year 2000. It is virtually certain that population in general, and our incoming students in particular will increase the use of digital technology to communicate with each other. Without question the 24-hours a day, 7 days a week culture our students inhabit is very different from the environment a few years ago. The need for such training has given rise to various **Learning Management Systems.** Before we focus on various training methods available today let us have a brief overview of LMS.

LEARNING MANAGEMENT SYSTEMS:

For providing an effective total learning environment for the modern day students an efficient LMS should be provided. A LMS essentially helps manage an organisations learning activities and competencies.

"*A Learning Management System (LMS) is a software application or Web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance."* A learning management system may also provide students with the ability to use interactive features such as threaded discussions, video conferencing, and discussion forums.

To generalise we can say "*A Learning Management System(LMS) is a set of tools that facilitate the delivery of the right content to the right students, at the right time, in the right format."*

A LMS typically provides, but is not limited to:

- Registration and tracking of students
- Content creation and delivery capability
- Skill Assessment and development planning
- Organizational resource management.

For the Learning Management system to be efficient and effective it should provide:

For the learners:

- List of courses that he can choose from according to his requirement.
- A chat board or a discussion board – where he would be able to exchange ideas, share experiences, post a query etc.
- If possible a e-mail facility or a e-mail link facility
- A notice board for posting various notices for the entire class
- A common whiteboard for discussion (synchronous learning)
- A self test tool for the learners to access themselves
- Links to various reference materials and course related tools.
- Access to classmates, instructors, experts, e-coach and technical support.

For the Course Author:

- Authoring tools including animation graphics to prepare and upload / modify the contents.
- Test and Assessment tools.
- Feedback on the course materials and its relevance from the learners.

For the Administrator:

- Registration facilities including issuance of login name/password to the learners

- Payment acceptance facilities.
- Monitoring of the students enrolled in the courses and subsequently maintaining a database of the same.

For the Course Manager:

- A complete over view of the entire course including the number of students enrolled in the course and stages of completion etc.
- An access to booking various facilities for contact programmes, conducting of tutorials and practical.
- A calendar tool

So far we have discussed the learning process, the changing learning environment and the learning management system to assist in developing that learning environment. In brief we can say that learning does not happen only in the classroom or from one particular source. It happens all the time, through various means, from different persons and from varying experiences. To ensure a meaningful and memorable learning experience, the learning environment should comprise of instructions, varying situations, constructive and supporting environment, good communication, collaboration, networking and finally an evaluation process. This creates a ***Total Complete Learning Environment***.

TRAINING METHODS PREVALENT TODAY:

Training by itself has a very broad definition. The main objective of training is to enhance and accelerate the learning process thereby creating an understanding of the required knowledge and the underlying skill to use that knowledge. Knowledge is under-nourished if the required skill to execute the task is not achieved. Various training methods that are prevalent today are as follows:

- Conventional class room teaching

- Tutorials and practicals done in labs, workshops, on board ships etc fine tuning the skills to be achieved.
- On the job training – using various Industrial training projects – sending students to work to different organisations to attain practical experience to supplement their knowledge gained.
- Finally training using Information technology:
    - ***Computer based Training (CBT's)*** – quite popular and a lot of them available in the market today. This is one example of "training anywhere and at anytime". This does not require the use of Internet or need high speed downloads. All the student needs is an access to a computer and learning takes place at his own pace.
    - ***Web based Training*** – where in the course material is available over the web. The course materials are situated in a dedicated server where in the student can access the same any time by logging on to the site and using his login name and password. This requires an Internet connection, high downloadable speeds and is usually restricted to text and minimum graphics due to the speed of the internet. Even when using broadband – it takes a long time to access streaming video's etc.
    - ***Simulator based training*** - Here the students are trained in a controlled environment that simulates the real life situation. The advantage of Simulator based training is that student can be trained on any critical situation with out having to worry about the outcome. More over students have hands-on experience in taking decisions when they control the inputs and the computer coordinates the instrument reading. In the maritime sector – various types of simulators are available and this we would discuss, further on in this paper.

Classroom based training is still arguably the most effective way to get across new skills, particularly those that teaches changes in behaviour or complex concepts. But it comes at a very high cost in terms of training charges, travel and lodging expenses etc and still does not guarantee the transition from theory to application in the work place. Training using Information technology has come a long way since it started, when training packages were merely electronic books. A good CBT should be interactive, involving the student and capturing their attention. Unfortunately we see a lot of poor quality CBT available in the market which do not capture the students interest and hence the purpose of training fails.

A couple of years back when we entered the 21st Century, we were all bothered with what was known as the "Millennium bug". We managed to put that behind successfully and closed the doors on the 20th Century there by entering the e- decade. Here we saw and heard the alphabet "e" prefixed to most of the words. What started off with e-mail has many followers such as e-commerce, e-business, e-solutions, e-opportunities etc so much so e-friend and e-mate were not so uncommon terms. Learning could not be left behind. Advancing technology gave rise to a new concept in learning known as **'e-learning'** that was to cater to our IT savvy students in the modern digital age.

WHAT IS E-LEARNING?

E-learning groups together education, training and structured information delivered by computers, through the Internet, or the Web, or from the hard-drive of the computer or from the organisations own internal network (Intranet). E-learning may use any of the media which we described in training using Information Technology but the only difference here is that e-learning goes one step further and adds human support through on-line tutors, thereby extending the scope of what can be effectively taught into many new subject areas. In addition, more supporting material can be made

available by capitalising on the ease with which web sites can link to other documents and systems. Here lessons can be taken anywhere anytime using multimedia i.e. a combination of text, graphics, sound and animation. These can be delivered to the learner via various means such as the PC, PDA, mobile phone and TV. Further, e-learning can be classified into formal lessons, which are structured, and informal means e.g. chat board, discussion board, e-mail etc. The much talked about life long learning through e-learning includes both types of learning to solve performance problems.

Benefits of E-learning:

When talking about benefits of e-learning – it can be discussed from the view point of the learners, the instructors, developers and the administrators. To be brief and to generalise the main benefits of e-learning are:

- Available anytime anywhere
- Lower costs to both students and the administration in the long run.
- Reduced time from the job thereby increasing productivity.
- Multiple delivery options by means of web, PC, CD-Rom, Internet, Intranet etc.
- In built student enrolment, management and monitoring facilities.
- Students learn at their own pace and are not restricted by time or group concerns.
- Encourages students to browse and acquire information from various hyperlinks on the worldwide web and obtain information suited to their personal situations.
- Succeeds in building self confidence and self knowledge as the student himself takes responsibility of his learning.
- Standardised training material available and delivered throughout the world – no matter where the student enrols for the course or the module.

- For the Instructors and trainers – all records of discussion are maintained and readily available for later reference.

Concerns regarding E-Learning:

- E-Learning requires a reasonable technological infrastructure. If this is not set up to an acceptable level, E-Learning cannot happen smoothly. The cost of setting up the initial infrastructure is quite high.
- Students and learners should be computer savvy – should have access to computers and internet. Technological competency is one of the requirements for E-Learning to take place. Both students and Instructors may have gaps in their computer knowledge and they will need to fill in these gaps by suitable training in computer basics before they can start online training.
- Technical difficulties or operator may hamper students and instructors.
- In some countries connection to the Internet using phone lines are expensive and may not be easily affordable. The Internet bandwidth may not be suitable or robust enough to support the desired level of Multimedia. Multimedia demands a lot of bandwidth. Developer of E-Learning packages should make careful decisions on deploying multimedia over the internet.
- E-Learning will only be a success if the material delivered on line manages to capture the learners attention. If it is going to be an electronic textbook with no interactivity then its failure rate will be high. Developers of e-learning should keep in mind that the learner is isolated from his class room and he needs to be motivated to remain glued to the screen. A boring content (unfortunately there are many such materials available) with very little graphics or animation and not enough interactivity will repel the learners from e-learning.

We have so far seen the changing scenario in the learning environment including the invasion of e-learning and its status today. It might not be wrong in saying that the

change of the learning environment in the maritime sector is slightly slower than the rest of the industry but we are catching up slowly.

MARINE SIMULATORS AND ITS USES:

In the last decade or so concern over marine accidents has focussed attention on the use of simulators for the training, performance evaluation and licensing assessment of mariners. A lot of private companies, maritime government bodies have made substantial investments worldwide in the development and use of simulator-based training facilities.

There is a wide range of Marine simulators in use and available in the market worldwide. Bridge simulators, Engine simulators, cargo handling simulators, radar simulators so much so steering simulators for training of the helmsman etc are available in the market. Different manufacturers offer different features and along with them come the cost. As of today Simulator training is quite expensive and the Return on Investment (ROI) takes quite long. Simulators are definitely an important training tool, where in a full-scale ship bridge simulator is capable of simulating a 360° view. Some of the simulators allow you to produce your own scale model of the vessel you wish to be trained on. Marine Bridge simulators can simulate a range of vessels in scenarios of real or generic operating conditions (like entering port or harbours) and can be used to train the mariners in a number of skills from the rules of the road and emergency procedures to bridge team and bridge resource management. Physical scale-model or manned model simulators use scale models of specific vessels that effectively simulate the ship motion and handling in fast time. Other marine simulators can train you in loading/discharging cargo handling and operation of machineries on board, Engine watch keeping and engine resource management etc.

As a training tool, simulators have a number of significant advantages:

- Training takes place in a “safe” environment and we need not be worried about the outcome. The outcome of the exercise would only be to reinforce the underlying principle.
- Training can be conducted at any time and situations like weather, traffic etc can be simulated.
- Simulation exercises can be recorded, replayed and reviewed so as to give the learner the full understanding as to where his error lies and how to correct the same.
- The instructor can terminate training scenarios at any time and modify the exercise to requirement of the learner.

Is Simulator training sufficient to train to avoid Marine accidents???

By using Simulator in training what are we trying to achieve. We are trying to change the mind-set of the person being trained and increase his awareness towards the risk factors that ultimately leads to accidents. The question one should ask is “Can we change the learners personality?” I would say ‘definitely not’ but at least we can try to change his perception with regards to the concepts which has been engrained into him. The other question is “How much training is required?” Is it sufficient for a person to undergo a 3 or a 4 day simulator training programme once every 5 years. The answer to this is again “NO”. As is done in the Airline industry – simulator refresher training with different scenario’s and different vessel types should be a part of continuous training for a sea-farer. At the moment it is not possible for an individual seafarer to afford a simulator training on his own on a regular basis. The prices of simulator’s are reducing and hopefully its not too far away that simulator training is affordable to every

one anywhere and at anytime ***may be even on the web at the convenience of his own home.***

It may not be long when every seafarer might have to do some sort of refresher's training before joining every ship on a simulator to reinforce and sharpen his skills which will contribute to his better performance on board.

R & D CENTRE AT THE SINGAPORE MARITIME ACADEMY

"Reach out to the world" is the philosophy behind SMA's R&D centre, the idea being to make "Maritime education and training" easily accessible to everyone in the world. Keeping in pace with most modern trends in learning, education and technology, this fully equipped R & D centre develops programmes both for in-house student use and for the industry. Since its inception about 4 years ago, the R & D centre has developed various Computer based training programmes, Electronic performance support systems, Management and monitoring systems etc for use of the marine industry. Some of the achievements so far are as follows:

EPSS for Turbocharger (ABB): An electronic performance support system for the operation, use, maintenance and trouble shooting of ABB turbocharger.

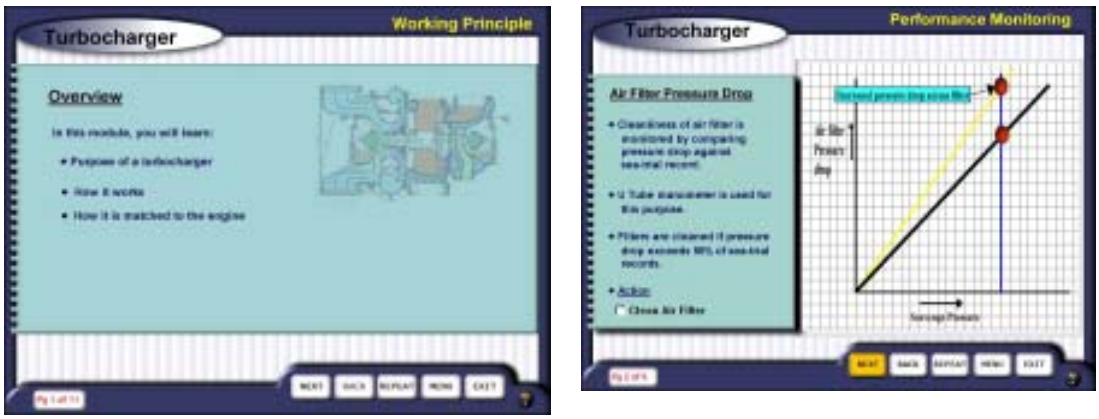

Figure 2: EPSS – ABB Turbocharger

Electronic performance support system for fuel pump timing – an expert help providing just in time coaching in checking and adjusting Fuel Injection pump timing for Sulzer RTA Engine. It also explains the working principle of the fuel pump for better understanding when carrying out the task.

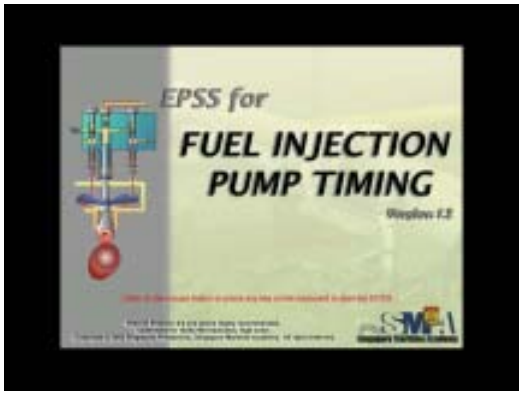

Figure 3: EPSS Fuel Injection Pump timing

The R&D centre has also developed various CBT's on **"Lifeboat – on load release gear"** for the purpose of familiarizing sea staff on the precautions to be taken when releasing lifeboats – thus helping to prevent accidents. **"Care and handling of Lifeboats for Class B Tankers"** is another CBT developed for use on board tankers.

HIV/AIDS – Be Safe Not Sorry – a computer based multimedia training programme to promote the awareness of HIV/AIDS among seafarers. This CBT was based on the project "Mobilizing a response to HIV/AIDS in the maritime industry" for UN ESCAP (United Nations Economic and Social Commission for Asia and Pacific) and was jointly produced by SMA, UN ESCAP, UNDP and jointly funded by UNDP, Joint United Nations Programme on HIV/AIDS and Canadian International Development Agency.

Figure 4: CBT on HIV/AIDS

A training module on **ECDIS (Electronic Chart Display and Information System)** for navigating officers to be familiar with the use and operation of Electronic Chart has been jointly developed with MPA.

Figure 5: Computer based training on ECDIS

An electronic **"Cadet Monitoring and management system"** was developed for MAERSK and NSSPL – with the intention of adding a guidance tool to enable the cadets to perform their tasks on board ships.

Future projects involve usage of PDA's to provide performance support and checklist and providing of web-based simulators is also being tested.

CONCLUSION:

Learning environment is changing rapidly and so are the learners today. There is a need to cater to the present crop of learners who are inquisitive, have a great thirst for knowledge and are on the move all the time. Knowledge is to be delivered to them at their own place in their own time instead of them seeking it from traditional temples of knowledge. Advancement in information technology makes this possible and the trainers need to deviate from the old tradition of classroom teaching – for learning to be more effective. Simulator is a training tool, when used effectively, have a good impact on the learners and aids in deliverance of skill in a controlled environment very similar to real life situations.

Who knows how the learning environment will evolve? Maybe future students will only know computers to be their mentor, philosopher, guide and role model!!!

References:

Simulated Voyages by the Committee of ship-bridge Simulation training. USCG

Championing e-learning by Brooke Broadbent Pfeiffer Annual for 2001.

Distributed learning by Diana G. Oblinger and Mark K. Maruyama 1996- Cause professional paper series #14

Now that the students have wings by Kenneth S. Morrell – Rhodes University

Is E-Learning Floundering by Kaliyun Islam – e-Learning magazine.

E-Learning and the Nonprofit sector - White paper discussion of the potential of e-learning to improve nonprofit management training by Bill Tucker ©SmarterOrg, Inc

Making Distance Learning Effective: A New Approach in Maritime Education & Training by Rajan Bhandari, Section Head, R&D Centre, SMA – Paper presented at the First National Conference on Maritime Education and Training in Manila July 2002.

CBT's Impact on the Maritime Industry by Professor P.Muirhead, FNI, Inmarsat Professor of Maritime Education & Training, WMU, Sweden. Paper presented and published at CBT@Sea Conference in London Nov 2001.

Integrating CBT into the Learning Process by Robert Rayner, FNI, Managing Director, IDESS - Paper presented and published at CBT@Sea Conference in London Nov 2001.