Compulsory Simulator Training Stages for Deck Cadets

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Abstract: For the maritime officers, the most important issues that we have are insufficient knowledge of the capabilities, and limitations of the electronical equipment especially regarding the use of ECDIS. Other identified problems are overconfidence in own capabilities, poor team work, lack of good knowledge of the maritime area that own ship is sailing on, and insufficient or severe lack of knowledge of the ship's characteristics.

In our paper we are trying to address these issues, in the form of simulator scenarios that use the participants' knowledge and teamwork skills to the limit. During these exercises, up to seven virtual bridges are used to provide a realistic feeling of stress and sensorial and intellectual fatigue. The aim is to encourage team work and improvement of individual performance, as well as a realisation of own limitations and the limitations of the available equipment.

With the compulsory new requirements imposed by STCW we extended the navigation simulation stages also to our students from the second year of study. Based on the experience that we will achieve this academic year, we will see if a familiarization with the SHS will be suitable to start from the second semester of the first year of study.

Keywords: maritime training, deck officers, cadets, simulation, maritime students

1. INTRODUCTION

The maritime trade industry along with the maritime transportation of goods and persons, have long been considered of strategic importance for the economy of any country. The reason is: no country is self sufficient, nonetheless because it requires raw materials or specific processed goods from another part of the world; or simply because it takes part in the open market intrinsic activities. Thus, there will always be a need for shipping large quantities of cargo, especially over large distances. As lucrative or strategically important the shipping industry may be, it also presents unique dangers and challenges both to the ship herself and to her cargo. Among these the most common are: the act of God,

piracy, pollution and human error (that be can and usually is the cause for most incidents and near misses on board ships).

Over time a lot of energy and effort had been put into developing or adapting existing reliable technologies that are able to neutralise or at least diminish these risks. It is rather unfortunate that most of these developments were processes of trials and errors, but end result is that today's newly built ships are incredibly safe and easy to operate.

However these technologies took a long time to develop as the need for them became apparent after major incidents occurred that was so severe, that international legislations had to be changed. These new laws usually enforced upon the ship-owners the use of modern ship equipment for navigation, safety and security purposes, and set standards for minimal equipment function level.

Despite the never ending advances in computer based navigational systems, integrated bridge consoles, and modern communication equipments, together with an ever more stricter standards of training for maritime officers and ratings, every year brings a new and rather surprising high number of marine casualties. Naturally each of these incidents is investigated and, most unfortunately, usually the fault lies with the person (or persons) responsible for specific operations (i.e. holding the watch, cargo operations or other). That said just as the equipment producers have come up with redundant systems that almost never fail, so should the maritime training centres try to identify the means by which the human element on board ships could be improved in its performance.

We at Constanta Maritime University (CMU) believe that the answer lies with rigorous training and selection of the future maritime officers along with continuous training programs afterwards in collaboration with shipwoning companies. But the training programs should be better adapted to suit the needs and requirements both of the students and their employers [1].

2. THE STUDENTS

From the very beginning of this article we would like to emphasise that at CMU we consider the initial training period as an integral part of any person's professional career and life as an maritime officer. Because of this we are trying to identify heir specific needs and requirements by conducting research programs and paying attention to other similar programs that are undergoing in other training centres. One interesting find is that in recent years, there are an ever increasing number of students that are the very first in their families to take up a career as a mariner. Even more surprising is that some of the come from communities that have no traditions or experiences related to ships or seafaring. They are attracted by the prospect of earning large amounts of money relatively early in life and starting a private enterprise on their own, and generally have an idyllic image of life on board. Very few of them desire to reach a managerial position, and even fewer envision retiring after having a successful career as a master [2]. Unfortunately however, these students have also the largest percentage of dropouts. We also consider them as having a higher risk of becoming depressed later in life for not having achieved their goals and thus become more accident prone. For these reasons we are encouraging former students now chiefs mates or masters, and teachers in our staff who have senior experience at sea to interact with the students. These interactions usually take place as seminars on topics ranging from what are the absolute necessities that must be in the bag when leaving for a voyage, to how life on board a ship is and how to interact with persons of different

culture. Generally speaking they are given great liberty in their choice and developments of topics and this is why these seminars are so popular.

Another interesting find was that we had to adapt our teaching methods and to some degree change them to suit the mentality and skills that the students now commonly have [3]. It is a common belief in Romanian universities that the student's training level prior to the admission is at an all times low. Nonetheless we have found that these students are somewhat different from the ones that were in our classes only 10 years ago. They are more computer orientated, because they use their pc intensively especially for entertainment purposes. It is because o this that the more abstract and theoretical topic do not especially appeal to them. We do not mean to imply that we have renounced important parts of the teaching syllabus such as mathematics, or maritime law. We are simply stating that we have discovered that students react better to lessons that have practical applications. Especially the students that are studying to become maritime deck officers become more attentive especially interested when they reach that part in their training that relies heavily on simulations [4]. This is why we are considering the introduction of simulator training exercises for students in their first year of study, although there are some concerns related to the overuse and costs of maintenance and use as well as available time schedules.

The simulator training exercises are of varying difficulties, from simple accommodation routines to the more advanced exercises that are inspired from regrettable real life maritime incidents, which we analyze over the years. Such scenarios may include collision avoidance, coastal navigation into or in proximity to shallow waters, and dangers to navigation. They may include also navigation during rough seas, or stormy weather, or navigation in waters that are notorious for their heavy traffic, such as the English Channel and the Asian waters. The primary objective is the student's familiarisation with the navigational equipment such as the ARPA radar, the ECDIS, VHF emitter/receiver, ad of course different types of ships. They use these equipments in a controlled virtual environment, they learn its limitations and weaknesses so that when they go on board a real ship they will have a much easier job at adapting to the life as a seamen. Also, most of these exercises have a requirement that most if not all communications are done in English, primarily using the Standard Maritime Communication Phrases.

During these exercises we are interested in showing them their own limitation by putting them through difficult situations where they can not multitask, and have to work as a team, and delegate responsibilities between them. During such exercises, they are expected to communicate with different stations or ships (usually instructors or other student teams), while dealing with other problems such as heavy weather, heavy traffic, a wide variety of alarms or equipment failures, or faulty information that has to be filtered or compared with information obtained from a different source [5]. Furthermore, we are about to integrate de engine and the bridge simulators, along with the cargo simulators, thus the complexity and realism of the exercises is vastly improved.

In the last year of their studies, we concentrate on their training as maritime officers [6], with courses specifically designed to address matters such as the planning and executions of a maritime voyage, loading stowage and unloading operations for liquid and dry cargo, together with more special applications of the maritime law regarding ship operations in port and at sea.

As an element of novelty we are also looking for the possibility to include special procedures for pirate boarding avoidance manoeuvres as part of these courses and of the normal curricula as well. As piracy acts are becoming more an more a commonality [7], and as international efforts are getting more and more efficient, it is still the job of the officer of the watch to take the necessary actions to prevent pirates from boarding,

at least until help arrives. These theoretical seminars would then be rehearsed in simulations [8]. The evasive (escape) manoeuvres are similar with the ones used in the Navy. For this training we have to take into account the limitations imposed by the own ship speed (that in most cases is inferior of the speed of pirates boats) and the maximum angle of ruder that can be used for zigzag manoeuvres in order to prevent violent bends of the ship that can damage the cargo. In order to increase the chance of success in discouraging pirates boarding, escape manoeuvres must start as soon as the danger of pirates is acknowledged. For this reason, special radar training is needed in order to teach the students how to monitor the stern sector and how to early detect high speed small targets coming from the stern.

3.   THE MARITIME OFFICERS

As the men and women that are on board ships they are the eyes and ears of their vessels. They share the responsibility for safely operating the ship and the safety of her crew. Their work relies mainly on their experience, and good seamanship, as well as with a good understanding of company safety and security policy and protocols, along with a good professional relationship with the other crewmates, and an excellent professional conduct.

It goes without saying that to be a good ship officer you have to be an specialist in your area of occupation be it navigation or electrical or engineering, it takes a long time to train and prepare such an individual. And generally speaking after certification to the STCW 98 required levels these individuals are usually more than qualified to do their jobs. However there are exceptions to this rule. We are not referring only to the newly certified freshmen, that are doing their best to prove themselves under the watchful eye of the master, but we are also referring to the more seasoned officers. As stated above these men and women rely on their experience to take decisions [9], experience that would usually be gained form operating on board of tens of ships. Just as this is a blessing it can also become a burden because each ship is unique. From the protocols by which they are operated or handled to intrinsic faults due to operation or technical failures, even sister ships differ quite a lot from one another. This is why ship handing over procedures was developed. The problem is that for every ship that has a proper handing over procedure there are at least tens in which newly arrived officers have only a few hours to take up to speed what kind of papers are due for forwarding and "where is what" on the ship.

This is why CMU is planning to devise special courses in collaboration with crewing and ship owning companies [10] with the aim of reducing the stress of being transferred on a new ship, along with reducing the risk of incidents that can occur with it. We hope to achieve this by including in this programs simulation sessions with a virtual recreation of the ship these officers a going to take on the near future, along with realistic recreations of the electronic equipment they are going to find on board the ship. These simulations are going to include ship handling scenarios in real like ports that their future route are is likely to take them. This way they can practice port entering and exiting operations during day or night or in restricted visibility conditions, in a perfectly secured and controlled environment. This is important especially for ports that have a problematic accessibility due to naturally occurring phenomenons such as wind or tide currents, or because of the particulars of the ship regarding ship length, breadth, size and propulsion or steering system. In addition during these simulations will put great emphasis emergency procedures

for prevention of pollution or for reducing the pollution during cargo operations for liquid or gaseous cargos, company and port and/or terminal procedures for cargo operations and ship landing and departure protocols. Also included in such courses will be damage

We are confident that such programs will be vital for officers at managerial positions with special thought for masters, especially masters that are changing the type and size of ships they have had usually commanded.

The indirect, but very important, benefits of such programs are that apart from refreshing their knowledge and reinforcing their beliefs in their own skills, along with a thorough verification of their teamwork skills. Moreover the crewing agencies and the ship owning that are subsequent beneficiaries of such courses and are also provided with detailed progress report of each individual, so that they are well informed about each individual performance.

We are also looking into improving our master programs. It is not a novelty that each new maritime officer is required by the international Bologna treaty to graduate a relevant master and obtain a degree in a relevant area of expertise should he or she desire to be granted a managerial position on board a ship. Until recently, at our university these educational programs were view as a furthering of knowledge that has been previously thought. Although this approach was not entirely faulty, it soon became apparent to us that much more was needed. We are currently analyzing the possibility to implement leadership courses in the syllabus. The idea behind this concept is that even the most professionally well prepared chief mate or chief engineer or master can be hard stricken by the realities of command or the hardness of leading a community of men through the hardships of life on board a ship [11]. For many years, at CMU, the leadership concept was assimilated with the Navy on board discipline and was ignored as part of the training for the merchant marine officers. Some men and women have a naturally developed instinct of leadership, while others do not and usually end up becoming the type of leader that keeps to himself, and remains secluded in his cabin, or when he has to come out and face one situation or another is already unease and has to shout out his authority. Such group leaders are unfortunately common on board ships [12] and to some extent it is expected of them to behave as such. However recent studies and researches in this field have shown that such an approach to leadership is counter-productive. This is why we are trying in our new leadership course, to adapt the classic "best practice" principles to the realities of the multi-cultural crews and cross-cultural interchange that are a day by day reality on board all maritime ships.

In an effort to improve upon such performances, we at the CMU are planning to develop theoretical courses that are comprised of group sociology, leadership classes along with practical exercises that include simulator exercises. These simulations will have objectives that the officers can not achieve only by themselves. They will have a team, made up of variety of persons that will have some training but not sufficient expertise, possibly students that have previous experience with the simulator. The final objective of such exercises should be a quantifiable improvement of how these officers work in a team and a verification of how they implement their newly acquired theoretical leadership skills.

4. CONCLUSIONS

It is said that the world of the maritime trade and transport is full of many immovable traditions. Indeed in many cases such is the truth but with good reasons. From customs such as the cadet's baptism to the OOW`s (Officer of the watch) morning gyro verification with the sun's azimuth or double verification of the ship`s position with different kind of fixes, all of these traditions are now considered proofs of good seamanship. They are considered as such because over time they proved their value, and thus were passed along through generations down to present day, when they have taken the form of protocols or regulations such as COLREG.

However, most if not all these traditions were at on time an innovation, untried or untested, but often the result of a necessity. Whether behavioural or mainly technical in nature, they have shaped the maritime transport industry into what we now today [13]. Nonetheless there is a twist: if we make a comparison between the maritime incidents in the not so distant past, let us say 50 years ago, and the ones in the present we will find that the more recent accidents are almost always caused by "human error" as opposed to the past ones that were mainly caused by "mechanical or equipment failure". This is because every time there has been a maritime disaster due to "equipment failure" it had been followed by a leap in the quality and complexity of the respective systems. This is how all the electronic system that on board nowadays ships is of the highest standard and performance. If the performance of the maritime equipment is the responsibility of the producing companies, so should the maritime educational system take, at least a partial, moral responsibility for how their former students perform. Consequently we, as maritime training institutions must devote a great deal of resources into not just having training program that satisfies the requirements of the STCW convention. Instead we should both meet these requirements and go beyond them, trying new approaches to the maritime training [14].

Of course there is the problem that each individual has his unique personality, and his performance is altered if fatigued and under stressful conditions. They make it almost impossible for any training programs to guarantee that their student will never be participants in a maritime accident. Despite this, a rigorous and adaptive training program may be the key element for ensuring just that. And one of the most important parts of such a program is the simulator training. No longer just a modern way of teaching, it has already become a vital piece of the training experience. Both for the students who have increasingly higher computer skills and more easily acquire new ones by using the simulator complex, and for the maritime officers. Especially important for the later ones, is that it provides them with information about the personal and equipment limitations, which we have found are primary causes of accidents.

At CMU, the maritime simulation training starts in the 3rd year of study. Based on the experience that we will achieve this academic year, we will see if a familiarization with the SHS will be suitable to start from the second semester of the first year of study.

We are looking forward to seeing the results of our programs and share them with the rest of the maritime education and training institutions family, as well as contributing to the tradition of educating men and women for safely navigating the oceans and seas.

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