Towards Dynamic Maritime Education and Training Systems

Capt. Ahmed Kassar, PhD.

Arab Academy for Science, Technology and Maritime Transport, Email: alkassar_ahmed@yahoo.com

Abstract

Despite the rushing development in shipping industry paralleled to technology acceleration, accidents and disasters still frequently happened. MET systems still relying on the minimum standards laid down by STCW convention to achieve the required standards for competency and qualification of seafarers. Furthermore, STCW convention does not designate the suitable teaching methodology for different subjects to achieve the required competencies and skills.

Maritime education and training depends mainly on providing candidates with knowledge and competencies to be able to perform certain duties and assignments, without any consideration of candidates’ self-experiences, industry feedback and lesson learnt from previous accidents, incidents and near-miss reports.

Same safety training and proficiencies are provided to Master and First officers on one side, and Chief engineer and Second engineer on the other side at management level, this means repetition of the same proficiencies whether during upgrading studies or refreshment of competences. Officers at management level can have instead more advanced management studies depending on the intellectual development, sharing of experiences and industry feedback.

It is important to have more reliable and effective MET system capable to overcome the problem of human errors and be able to keep pace with shipping industry updates. A proposed methodology for a more dynamic MET system is introduced as a new approach on how the maritime education and training can be provided to seafarers.

Key Words: Maritime Education and Training systems (MET), Dynamic Education System, STCW Convention, Experiences Exchange, shipping Industry

1. Introduction

Shipping today is a highly technical professional discipline. It requires special workforce with considerable skills, knowledge and expertise. Effective and reliable standards of training are the bases of a safe, secure and clean shipping industry. The main goal of MET standards is to provide learners with the required competences and proficiencies, yet experiences only achieved during practicing of work onboard ships along unlimited time duration, where seafarer practicing trial and error until reaching satisfied performance. However, seafarer experiences and their response to different situations always differ from one to another, despite the fact that maritime training institutions are generally implementing the standards of STCW convention as a minimum requirements guided by IMO related model courses.

STCW convention standards still provided to student as indoctrination of subject material without any consideration paid to the role of human errors in shipping accidents and the surrounding contributing factors that affect efficiency of preforming assigned tasks.

In fact, what has been achieved in technology during the past two decades can’t be even compared with the whole progress that has been achieved during the last century as a whole. Despite the technological development in all sorts of life, it hasn’t been imitated the same way with same speed in shipping industry, not only in the field of shipbuilding, management, but extends to different other management style, whether onboard ships or in shipping companies.
Effective education deals with emotions, attitudes, and values of students through instructional design to modify thinking and behavior of the learner. Khan,(6). In order to provide ships with crews having qualifications and experiences always aligned with the frequent development in shipping industry, and being able to prevent accidents in active and professional manner, MET has to be more allied to industry and represents reality of work at sea.

Moreover, to add value to MET systems, it has to rely much more on sharing experiences rather than listening to repeated knowledge and skills, especially for those at management level as Masters and Chief Engineers. In addition, shipboard staff need to be fully conversant with supporting professional techniques such as management and intellectual sciences.

2. Shipping Accident and Human Errors

According to the annual report issued by Allianz (1), shipping losses continued their long-term downward trend with 85 total losses reported worldwide in 2015. Although the number of ships losses remained stable yearly, declining by just 3% compared with the previous year (88), which fortunately makes year 2015 the safest year in shipping for decades. Losses have declined by 45% since 2006, driven by safety environment and self-regulation.

Cargo and fishing ships accounted for over 60% of ships lost globally, with cargo ships losses up for the first time in three years. The most common cause of total losses was foundering (sinking), accounting for almost 75% of losses, also up 25% happened due to bad weather. In general, the report declared 2,687 reported shipping incidents globally in 2015.

All references and statistics of shipping accidents during the last five decades have pointed to human errors as the main reason behind 85% ~ 90% of accidents at sea. EMSA, (2) declares that the main factors which have an effect on the potential for human error are education, training and working conditions. Therefore, the better the education and training received by seafarers is, the safer shipping will become.

According to TrasNav, (8) There are two factors that Human errors depend upon, the internal factors which related to the operators’ characteristics and differences such as skill, experience, task familiarity, and the external factors that related to equipment design and installation, task complexity, work environment, organizational factors and operating procedures. A proper balance between the capability and experiences of the human operator and the difficulty of the task would decrease the likelihood of human error.

As Jenni (5) explained the underlying theory of incidents reporting or what is known as iceberg model or accident pyramid, that, for every serious accident, there are 29 less serious accidents and 300 near miss cases. However, near misses and less serious accidents have the same underlying reasons as serious accidents. Incidents and near misses are usually unnoticed and unreported, and quite often seen as normal operational failure issues. As no accidents have occurred, as result of these unreported incidents and near misses, or avoided due to unintentional acts, they have remained hidden. However, the world has become more aware of major accidents that involve ships, than the initial events or faults that if the chain or the tree of faults or events is accomplished, risk might accelerate and lead to unavoidable serious accidents.

Procedia, (7) declared that learning lessons from incidents and near misses improves safety performance. The mandatory International Safety Management Code requires shipping companies to establish a reporting system in order to promote continuous learning in safety management. However, incidents and near misses still reported poorly in the shipping industry, and always limited to the level of shipping companies or certain group of fleets, but not yet broadcasted worldwide and not effectively utilized in MET.
Therefore, if incidents and near misses are frequently reported, communicated globally, and then integrated in the MET systems, serious accidents would be avoided and diminished worldwide.

Unfortunately, reasons behind several accidents onboard are relatively the same and repeated along the last nearby decades with the same way, consequences and errors. Seafarers onboard are systematically focused on performing tasks depending on their acquired experiences and skills without any consideration or review of steps that shall be taken to start or carry out the required task. Onboard ships, seafarers at all levels, gaining experiences through their own practices or individual situational circumstances; there is no chance for them to study or upgradetheir knowledge and skills.

3. Shortcomings of the current Maritime Education and Training system

The latest major amendments to the STCW convention entered into force in 2012, the same year that has witnessed the disaster of passenger ship "Costa Concordia", just few meters from the Italian coast with the same reasons and causations of the "Herald of Free Enterprise" disaster that happened thirty-five years ago. This obviously indicates that current MET systems are still not capable enough to reach the right approach to cut the potentials of accident at sea.

STCW review reflects the same trends in the need for more specialization to address the higher-level maritime operations onboard through a wider coverage of knowledge, skills and competencies. STCW convention depends mainly on the competency-based training always targets skill gaps and focuses on performance of skills and acquisition of knowledge. STCW convention of course doesn’t contain any references to the suitable methodologies to be used to provide such competencies and skills. Using the traditional training methodology, that often generic, rather than targeted toward specific experience development.

Maritime education and training Standards are frequently amended and updated in response to proposals submitted by IMO’s parties, these always prepared according to research findings or outcomes of new technology and accident investigation reports. Proposals for change always proceed for prolonged procedures that might take four to five years duration until being completely effective. This prolonged procedures cause the graduated students become always behind industry updates and always attain obsolete knowledge.

Despite the comprehensive amendments of STCW convention, there is still a gap between the actual industry practices and the standards of training and competencies required to be addressed. There is a need to add much more proficiencies such as Port State Control procedures and Coastal State Control. In addition, special safety control and reviews carried out on tankers like; the International Tanker Owners Association review, Chemical Distribution Institute (CDI) M, (Marine), Tanker Management and Self Assessment (TMSA) inspection, and Ship Inspection Report (SIRE) Program on gas, oil, and chemical tankers have not yet covered as proficiencies in STCW convention. Seafarers only gained experiences on how to deal with such safety control systems through self-obtained experiences or by doing non-compulsory special courses.

Furthermore, practices and experiences have shown that there is a need for more proficiencies and skills to be included in STCW such as Proficiency in ship/ Helicopter Operations, Hydrogen Sulphide - (H2S)-Safety Training, Smoke Diving training, Proficiency of Safety Officers, Helicopter Underwater Escape Training (HUET).

Despite the evolution in management techniques, especially in the field of decision-making under mental strain, emotional intelligence, creative thinking, risk assessment and root causes; there is no intention of IMO parties to introduce such new/old techniques for ships personnel at management levels instead of repetition of the same proficiency short courses.
Despite, the application of quality management systems in all sorts of operation at sea through the implementation of the International Safety Management code (ISM) and the management system required by the International Ship and Port facilities Security code (ISPS), still there isn’t any required proficiency that address the application of quality management systems in the STCW convention.

Technology in MET has not yet well utilized, the STCW is still behind the usage of remote study, distance learning and electronic learning. The usage of social web pages, if modified and adapted, it will provide seafarers with effectual knowledge and experiences with enormous outcomes. Complete lectures and the outcomes of incident and near miss reports could be instantly downloaded or remotely broadcasted for seafarers.

As STCW convention statement, 'revalidation of certificate means establishing continued professional competence', that is obviously indicate the attainment of the same acquired proficiency and competencies IMO, (4). The proficiency short courses for officers at operation level and management level are the same. Advanced Fire Fighting, Proficiency in Survival Techniques and Personal Safety and Social Responsibilities courses are renewed or revalidated every five years, with the same competency and proficiency requirements.

4. Maritime Education and Training Styles

There are different teaching styles, lecturer can use in the classroom, such as the authority model where teacher-centered and frequently entails lengthy lecture sessions or one-way presentations where students are expected to take notes or absorb information. Some other style where lecturers demonstrate their expertise by showing students what they need to know. They combine a variety of teaching methods including lectures, multimedia presentations and demonstrations. Sometimes, lecturer promote self-learning and help students develop critical thinking skills and retain knowledge that leads to self-actualization.

Teaching style is considered effective when engages students in the learning process and helps them developing critical thinking skills and gaining experiences in the field of study. Despite, MET traditional teaching styles have evolved with the application of simulators and different multimedia applications, there still a need for new style which can make use of all available sources of information, sharing experiences and industry updates, specially accidents, incidents, near miss reports and different control regime reports. The new style of education will be adjusted toward students’ learning needs, industry updates and always find solutions for the frequent developed problems and potential risks.

As MET student are unique and completely different from any sort of students in all studying fields, especially those at management level, as they have already practical experiences in the field of study, they may attend this course before and they need to hear something new much relating to the current actual working environment. The MET needs integrated approaches to new teaching methods that merges the teachers’ experiences and interests with students’ experiences and needs together while adhering to the subject curriculum.

Due to the unique working environment of seafarers at sea, and the successive thousands of accidents that reported every year, a dynamic style of education and training is required. Dynamic style of education and training depends mainly on the direct interaction and exchange of experiences between lecturers and learners especially for those at the higher level of responsibility (management level). In addition, frequent industry development and updates are integrated in the education processes regularly. Moreover, feedback of industry is collected, analysed and then communicated between students, lecturers and researchers.

Martinson, (3) defined Dynamic knowledgeas “steps beyond just "know about” and steps into performance. It is actually doing something with the information, working with it, building skillsand understanding on a deeper level. Dynamic knowledge is to gain a feel for
something, to internalize information and have it become real and active in the learner’s world’. Information provided by a lecturer will challenge participants to take action based upon their decisions, whether the decision is the result of personal or group problem solving.

The experience-based training and development is a learner-centered approach to develop students experiences as well as updating lecturer’s practices and experiences. Rather than presenting information as a lecture-expert, a lecturer using this methodology will create situations which invite participants to discover their own answers to challenging industry issues and presenting student own intelligence in solving problems.

Sources of information required to be integrated in the teaching curriculums

To deliver the dynamic style of MET, there shall be a complete information database regarding each individual subject concerning the following:

a) The latest industry updates and the future targets and intentions of the industry developments.
b) The latest Port State Control and other special control regime reports including the most common deficiencies detected.
c) Updated database of collected incident, near-misses and unsafe acts reports worldwide.
d) The impact of the concerned subject on the safety of the user and the surrounding environment.
e) The impact of the related subject on the marine environment and how to avoid and control potential risks of pollution.
f) The impact of the related subject on the security of the ship as general and the security of information and protection of the shipping company interests.
g) The latest research updates and results.
h) Database of the accumulated especial experiences collected from students during previous classes.
i) Database of lecture’s tacit experiences and cases to study.
j) Student feedback on industry updates, human element and the effectiveness of newly implemented standards and requirements.

The following figure showing the main Parameters of the dynamic style of MET

![Figure 1: The main Parameters of the dynamic style of MET](image)

Figure 1 The main Parameters of the dynamic style of MET
Comparison between the Conventional and Dynamic Styles of MET

Table 1 Comparison between static and dynamic styles of MET

<table>
<thead>
<tr>
<th>MET Conventional Style</th>
<th>MET Dynamic Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concerning with the know how</td>
<td>Concerning with the development of acquired capabilities and experiences.</td>
</tr>
<tr>
<td>Answering questions like; what, How and when</td>
<td>Answering questions like how to manage, how to utilize and how to avoid.</td>
</tr>
<tr>
<td>Concerning with how to respond to emergencies</td>
<td>Concerning with gaining experiences from previous accident and learn how to take proper pro-active actions.</td>
</tr>
<tr>
<td>Providing information on technologies already exist in accordance with the requirements of treaties entered into force.</td>
<td>Providing information on recently applied technologies and the trend of industry updates and development.</td>
</tr>
<tr>
<td>Focusing mainly on major accidents</td>
<td>Focusing on all levels of accidents, incidents and near misses.</td>
</tr>
<tr>
<td>Knowledge and proficiencies are provided from lecturers to students.</td>
<td>Knowledge and experiences are shared between lecturers and students.</td>
</tr>
<tr>
<td>Not considering students experiences and their feedback on industry.</td>
<td>Considering students experiences and their feedback on industry.</td>
</tr>
<tr>
<td>The concept of training is to provide knowledge and skills.</td>
<td>Expand the concept of training to a wider integrated conceptual training system to include all contributing parameters like environment impact, security and safety.</td>
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</table>

Conclusion

Despite the obvious decrease in accident rates at sea and successive amendments to STCW convention, yet accidents still happened with the same reasons and errors. Human element remains in the forefront of errors that have led to accidents at sea.

The current maritime education and training systems still depend on the conventional model of education, that to provide students with knowledge and skills straightforward just to ensure that required proficiencies and skills are achieved. Feedback on the present maritime education system declared that present style of education is not effective enough to provide students with sufficient experiences on how to avoid errors and in turn accidents and incidents.

Dynamic system of education relies on the exchange of experiences between students on one side and students and lecturers on the other side. The presence of experienced student is also being utilized in the purposes of scientific researches and development of the industry.

There is a gap between industry evolution and maritime education, that the later always been restricted to the requirements of STCW convention and its amendments in force. STCW convention is still in need of more improvements and updates to be much more effective and tangible. Dynamic system of education is a unique system much suitable for maritime education especially for students at management level.

Recommendations

1- It is important to expand the concept of training from just providing knowledge and skills to a wider integrated conceptual training system.
Dynamic system of education is a unique style much suitable for maritime education, the application of it, could help in reducing the rate of accidents at sea and eliminating the potentials of human errors.

Reports of different levels of accidents should be globally collected, analyzed, and investigated, then, rebroadcasted to maritime institutions as lessons to learn.

There should be a clear identified link between MET and shipping industry. Maritime institutions should be step forward of the date of implementation of the STCW convention updates and amendments.

Officers at management level should have more advanced management studies such as; decision-making under mental strain, emotional intelligence, creative thinking, risk assessment and root causes.

There is a need to establish channels of communication between maritime institutions and graduates to update their knowledge and awareness of the industry updates.

STCW convention is still in need of more proficiencies to cover such as; ship/ helicopter operations, Proficiency of Safety Officers and handling of Port State Control.

It is important to expand the concept of training from just providing knowledge and skills to a wider integrated conceptual training system. The core of teaching material can be considered from multifunctional approach, for example, if the teaching syllabus was regarding safety practices, there should be thoroughly considerations of the environment impact, security, personal safety and the application of good management practicing.

It is important to consider the standards for revalidation and updates of competency certificates and, instructors, supervisors and assessors’ proficiency.

References:


