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The Implication of Distance Learning in Competence-Based Maritime Education and Training

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Abstract. According to Section B-I/6 of the Seafarers' Training, Certification and Watchkeeping Code (STCW Code), using distance learning and e-learning method to train the seafarers may be approval by the contracting parties considering the standards of training and assessment set out in section A-I/6 of the STCW Code (IMO, 2011).This paper will focus on the implication of distance education in competence-based Maritime Education and Training (MET).

Firstly, this paper will briefly introduce the background of competence-based MET, which is connected to the real shipping practice and may be referred as standards or performance based. Then this paper give the background of distance learning, which the learners and instructors are in different places. It will also introduce the fast development of the emerging technologies in the distance learning area.

Furthermore, this paper would discuss the implication of distance-learning in competence-based MET. Some suggestions would be made in order to enhance MET, including the revision of related regulations and domestic laws in order to recognize the implication of distance learning in competence-based MET. A thorough quality standards system that monitors the competence-based MET and the whole process of distance-learning should be implemented.

Keywords: STCW; Competence-based; Maritime Education and Training; Distance-learning; Quality standards system

1. Introduction

According to the statics of International Maritime Organization (IMO), human errors contribute to about 80% of the maritime accidents. The poor competence of seafarers is one of the main reasons that lead to the loss of life, large number of injuries and extensive financial loss (Ziarati, 2006). Therefore, it is important to have more reliable and effective MET system capable to overcome the problem of human errors and be able to keep face with shipping industry updates (Ahmed, 2016).

The International Convention on Standards of Training, Certification and Watchkeeping for seafarers (STCW Convention) try to give the international minimum standards for maritime education and training and the minimum requirements for the competences of seafarers. In 1995, the STCW Convention was totally amended to emphasis on the minimum competence of seafarers. In 2010, this the minimum competence of seafarers were clearly enhanced by newly Manila Amendments of STCW Convention. The use of distance learning and e-learning in MET is encouraged by the new amendments once again (Ruan, 2013). Distance learning and e-learning for training of seafarers are suggested under approval in Section B-1/6 of STCW Code.

In order to be well prepared for distance education in Maritime Training and Education (MET), it is quite essential to understand its implication. As the seafarers are on the first line to implement the conventions and regulations developed by the shipping industry, therefore, to improve the competence of seafarers by all means would help the shipping industry to enhance the safety of navigation and marine environment pollution prevention.

This paper tries to explain the development of distance education in competence-based MET and the future challenges that MET institutions would face. Some advices were concluded for well preparing the distance education for MET institutions and the Maritime Safety Administration (MSA) to improve MET practices.

2. Competence-based MET

2.1 Competence

Competence has very border meaning and usually refer to the minimum requirements of a worker to do the job. Competence can also be defined as the worthy performance. That is to say, in order to fulfil or exceed the objectives for their personal work, team, even the organization, it is the competence that describes the basic skills, knowledge and attitudes that people have to obtain (Gilbert, 1978). Therefore, the competences integrated with knowledge, skills and attitudes in the learning process are the basis in education and training.

Some countries, such as England, Scotland, Wales, Australia and New Zealand even integrated competence-based training into their national vocational qualification system. Currently, there are two main competence-based training model, the US model and the UK model. US model often put competences into a training program and take the priority for how to use the competences during the whole learning process. However, the UK model regard the competence as the units of assessment of workplace of activity. The International Maritime

Organization (IMO) adapted the UK standards model of competence-based training for STCW 95(Emad& Roth, 2008).

2.2 Competence-based MET

The STCW Code Section A-1/6 Training and assessment item 3 on Qualifications of instructors, supervisors and assessors says:
"Each party shall ensure that instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training and assessment of competence of seafarers either on board or ashore, as required under the Convention…"
In the Code, the numerous tables each have four columns: competence is in column 1, knowledge, understanding and proficiency (KUP) are in column 2, methods for demonstrating competence are described in column 3 and column 4 shows the criteria for evaluating competence.
Competence-based MET is a kind of method to approach MET that focus on seafarer can do, in respect to meeting specific standards rather than a seafarer's achievement. In competence-based education, student progress through learning objectives as they demonstrate mastery of content, at their own pace. It allows them to show what they know as soon as they know it. It is focused on what seafarers can do rather than on the course they have learnt (Deibinger & Hellwing, 2011). The main difference between competence-based education and traditional education are stated as following. First, for the curriculum, it can be variable in class structure as stated in the STCW where the management level, operate level and support level are listed. However, traditional education has standardized structure regardless of prior knowledge. Besides, all the competence must be mastered in competence-based education. In tradition education, some concepts may not be mastered by the student

3. Distance education

3.1 Definition

Distance education is an educational process and system in which all or a significant proportion of the teaching is carried out by someone or something removed in space and time from the learner (UNESCO, 2016). Therefore, distance education is a broad approach characterized by a high degree of variation of space and time. There are a considerable number of researcher's analyses that the concept of distance learning as additional mode of acquiring/transferring knowledge and skills in maritime education (Ng et al., 2009; Bauk et al., 2012; Buzadija, 2011; Flatcher and Dodds, 2003; Hanzu-Pazaraet al., 2010; Kadioglu, 2008).
With the rapidly developing of information technology, the new electronic teaching methods particularly through the internet, and different types of media and platforms narrow the distinctions between generations.

3.2 Reasons for integrated distance education in MET

Distance education has its own advantages and disadvantages like any kind other educational program. Before the distance education program start to enrol students, carefully consideration should undertook by both students and teachers in order to make sure that the distance education program meets the minimum requirements illustrated in STCW.

(1) Distance education advantages

As the traditional classroom training program require the seafarers to fix time and location, however, distance education program in MET can give a flexible alternative on time and location. Distance education can also relatively reduce the training fees and allow the students to learn without entering school. Besides, with the highly change of maritime technology and legal requirement, many refresher courses can also be delivered through distance education.

(2) Distance education disadvantages

However, there exist some disadvantages for the distance education in MET. Lack of social interaction is one of the main disadvantages. Although the student can have some interaction through email, chat rooms and other on-line platform, however, it is quite different than traditional classroom education. Besides, not all course can be offered online. Some courses directly with practical skills are hard to deliver by distance education.

4. Distance education in competence-based MET

4.1 Development distance education program in competence-based MET

According to STCW Code Section B-1/6 Guidance regarding training and assessment, each party has the responsibility to supervise the objectives and outcomes of distance and e-learning programs meeting the minimum requirements on the competences. Besides, unambiguous and direct instructions should be made to the distance education program to help the trainees understand the subject well. At last, professional and timely support through web, email, telephone and all other possible means should be provided by the teachers to help the seafarers systematically and effectively learning in the program.

One of the challenges that the distance learning may pose to competence-based MET is meeting the requirements of STCW in addition to the issue on quality assurance (C.Swapp, 2001). Therefore, on the basis of guidance from STCW, this paper develop the Figure 1 that shows the process of how to develop a distance education program in competence-based MET.

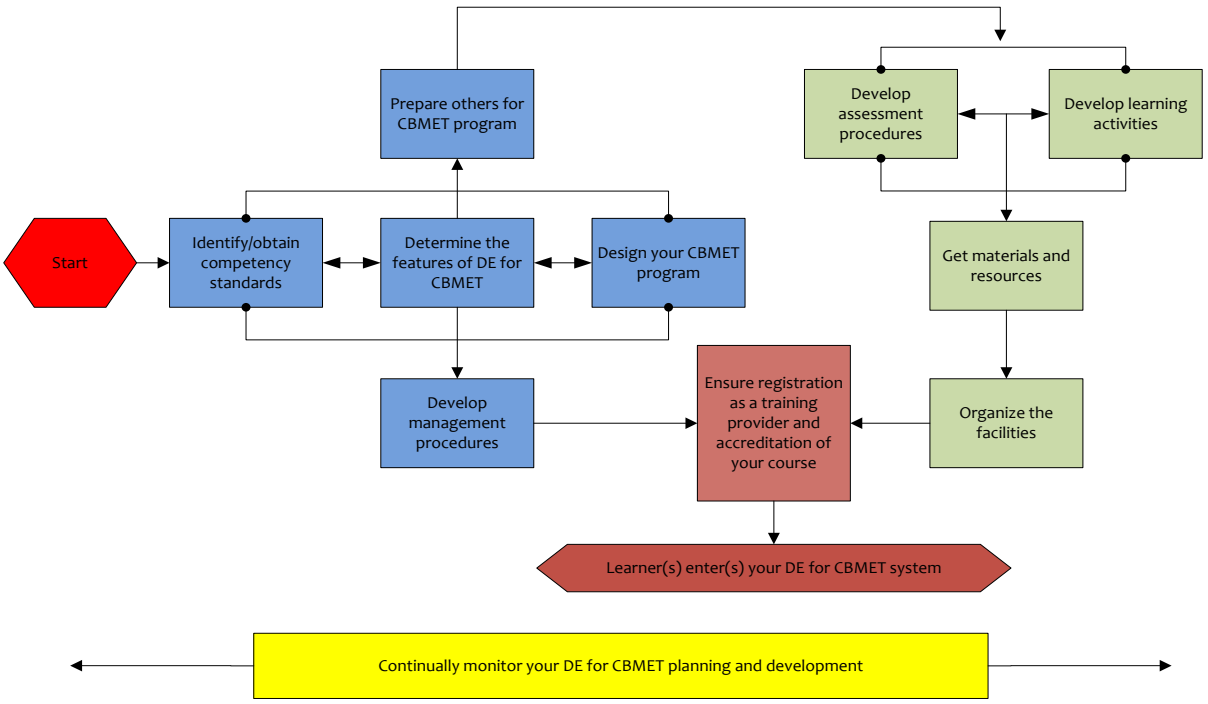

Fig 1: Development distance education program for competence-based MET

The crafting of distance education program in competence-based MET needs much careful planning and designing and continuous quality monitoring during the whole development process.

The first step is to identify the competences required in STCW Convention. As the STCW convention divided the seafarers into 3 categories, which is management level, operational level and support level. Each level would have their own competences required in the STCW Convention, thus it is the first step to identify and check the competences of the distance training program. Secondly, it is also important to illustrate the course delivery tools to the seafarers as different training providers may have different ways to delivery their own subjects.

Then, the learning environment through distance education must be stated and materials and resources should be provided for the learners. The program should also give the detail information on how to assess and the minimum requirement for passing the assessment.
At last, the management of distance education program and all the procedures should be covered by a quality standard system.

4.2 Learning in distance education program

In distance education program of competence-based MET, the learner has more responsibility in the learning process, however, the teachers must be qualified to guide the learner as well as assessment procedures. Figure 2 shows the whole process of learning in distance education program of competence-based MET (Harris,1995).

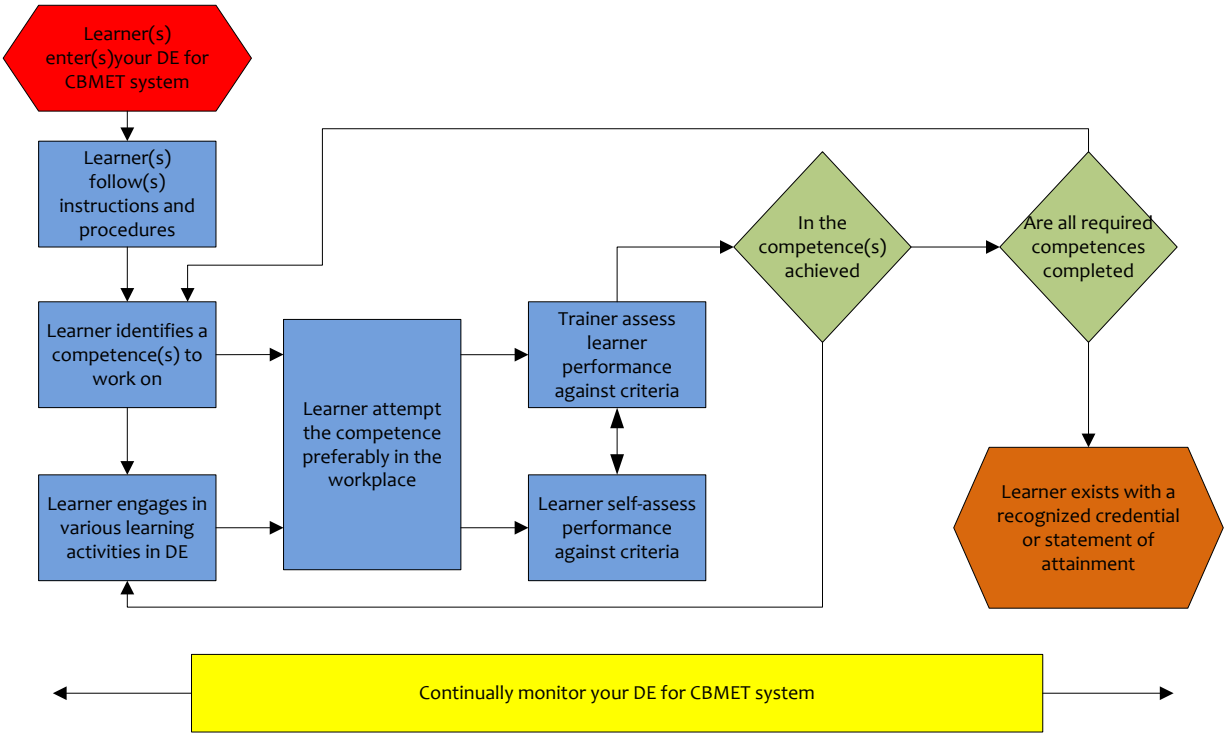

Fig 2: Learning in distance education program for competence-based MET

Although the distance education program provides a self-paced mode of learning and flexible delivery of competences under STCW, however, it does not mean that learning is totally unstructured.

Firstly, it is very essential to identify which competences the learner wants to achieve. This includes analysis how many competences already gained and which still need to learn.

Secondly, the learner undertakes the learning activity engages in various competences based performance is measured according to specific criteria stated in STCW.

At last, assessment will be conducted to confirm whether all required competence have been achieved. If some competences are already achieved, the learner can step back to enroll this program again unless all the competences listed in STCW are gained and relatively statement or recognized certificate will be issued.

4.3 Example MET programs through distance education

4.3.1 Current MET programs through distance education

Singapore Maritime Academy (SMA) is deemed as the pioneer using distance education in MET. Around 2000, SMA developed an e-learning program based on CD-ROM to provide a training course regarding launching lifeboat. Nowadays, more and more MET institutions and shipping companies have involved in developing distance education programs in MET.

For Example, California Maritime Academy offers on-line training course for maritime security awareness from 2006(Webster, 2006). Plymouth University in

UK have made a lot efforts in distance education and provide some course delivered by distance education. Some Non-government organizations, Classification Society and maritime training centre also provide some training courses by distance education.

4.3.2 Establish a competence based training program through distance education

Since the International Ship and Port Facility Code (ISPS) was agreed at the International Maritime Organization in December 2002, the issue of security amongst shipping and port industries has become of paramount importance, not least due to the rise of piracy in several areas of the world (for example, the Somalia Coast, the Gulf of Aden and the west coast of Africa).
The STCW 2010 Manila Amendments came into force on 1 January 2012. Ship security training is becoming mandatory requirements for all seafarers. We have developed a range of courses to meet the requirements of the STCW Convention and ISPS Code.

✧ **Module 1: Proficiency in Security Awareness(2 days)**

Under the STCW 2010 Manila Amendments, this course shall be undertaken by all seafarers employed or engaged in any capacity on ships which are required to comply with ISPS Code (Table A-VI/6-1, STCW Code).

1. Contribute to the enhancement of maritime security through heightened awareness
2. Recognition of security threats
3. Understanding of the need for and methods of maintaining security awareness and vigilance

✧ **Module 2: Proficiency in Designated Security Duties (3 days)**

Every seafarer who is designated to perform security duties, including anti-piracy and robbery-related activities, shall be required to demonstrate competence to undertake the tasks, duties and responsibilities listed following (Table A-VI/6-2, STCW Code):

1. Maintain the conditions set out in a ship security plan
2. Recognition of security risks and threats
3. Undertake regular security inspections of the ship
4. Proper usage of security equipment and systems, if any

✧ **Module 3: Proficiency as Ship Security Officer (7 days)**

Every candidate for a certificate of proficiency as a ship security officer shall be required to demonstrate competence to undertake the tasks, duties and responsibilities listed following (Table A-VI/5, STCW Code):

1. Maintain and supervise the implementation of a ship security plan
2. Assess security risk, threat and vulnerability
3. Undertake regular inspections of the ship to ensure that appropriate security measures are implemented and maintained
4. Ensure that security equipment and systems, if any, are properly operated, tested and calibrated
5. Encourage security awareness and vigilance.

5. Challenges and suggestions

5.1 Challenges

As current practice in MET, distance learning is not applicable and popularized for mandatory certification of seafarers due to the lack of approved training facilities, approved examination and assessment systems and quality standards system to control the MET activities.

(1) Technical challenges

Distance education tools and technology were agreed to be effective supplements for the traditional learning styles (Suresh& Anne, 2014). In recent times, advanced software programs, associated hardware and simulation tools have enable multi-mode distance learning options (Lokuketagoda, Ranmuthugala and Jayasinghe, 2015). However, in some countries, it might be very difficult to access the Internet. The limitation of computer and IT technology to some extent may hamper the using of distance education. In such a circumstance, the above provisions in the amendment constitute important technical support, and more and more distance learning and e-learning activities may come up then.

(2) Assessment in distance education

Assessment in distance education is also one of the key issues. Summative and formative assessment are the two main categories of assessment based on the function each serves and the timing of its application (William & Black, 1996; Harlen & James, 1997). In traditional classroom education and training, assessment can be through assignments, exams, and tests. It is important to design valid and reliable competence-based assessment that resemble situations that starting professionals or trainees can confronted with in real working life. Competency-based assessment is a collection of evidence to demonstrate that the seafarer can perform or behave according to the minimum competences in STCW Convention (Sharon, 2012).

(3) Quality assurance

Regulation I/8 emphasizes that all training, assessment of competence, certification, including medical certification, endorsement and revalidation activities are continuously monitored through a quality standards system (STCW, 2011).

Monitoring of all the processes of distance education program to improve the accreditation standards, guidelines and procedures for quality assurance regarding learning, faculty, students, scale and access should be fully implemented.

(4) Competence standards

The core feature of a competence-based MET program is the minimum standards of the competence. Therefore, it is quite essential to identify the training needs under STCW. However, for a cadet pursuing his/her certificate may not have all the mandatory courses available through distance education as it is not suitable for all competences. For example, some practical skills cannot learn and perform through distance education.

5.2 Suggestions

(1) Improve the legal framework

It is suggested that related administration to amend or improve the current law and regulations under the requirements of STCW Convention to promote the distance education as a recognized method for MET. Distance education for seafarers has to be recognised as an authorised form of education (Jerzy & Pawel, 2014). IMO and the administration are responsible to arrange a proper transition process to distance education(Gholamreza & Wolff, 2008).For example, it is very important to develop a legal framework that allows certification and examination system under distance education in MET.

(2) Promote international cooperation between MET institutions

Nowadays, the number of maritime institutions providing distance education program is small after all. For the most of MET institutions, challenges will be encountered during the implementation of distance education program in respect of maintaining qualified maritime expertise, installation of training simulators and equipment, etc. The theme of 17th Annual General Assembly of International Association of Maritime Universities was working together: the key way to enhance the quality of maritime education, training and research. Therefore, co-operations and networking between MET institutions, thus, is recommended in such a case. Likewise, the recognition of credits between two different MET institutions may also be an issue to consider.

(3) Establish lifelong distance education platform

With the rapid development of maritime conventions and application of modern maritime technologies, sustainable refresher learning would occur among the whole shipping industry. Distance education may be the most flexible method to provide this kind training. Therefore, it is suggested to establish lifelong distance education platform with various and quality courses.

6. Conclusion

The STCW 78/10 Convention requires levels of knowledge, understanding and skill for all seafarers on each level, and distance education is one of the methods recommended to achieve this outcome. This paper firstly give the definitions of competence-based MET as well as distance education. Some advantages and disadvantages for integrating competence-based MET through distance education were illustrated. Secondly, this paper also provides the developing process and learning process in distance education of competence-based MET. At last, some challenges in technical, assessment, quality assurance and competences standards are detailed analyses and some related suggestions are given for improving.

While distance education is growing, it may be 'not as good' as the traditional training programmes to some extent. This paper would welcome all maritime academy to collaborate in coming up with solutions for seafarers training by distance education in competence-based MET.

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