Simulation Systems & Training Methodology
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Abstract

The revised STCW 95 Convention have adopted the use of simulators as a tool in training and assessment, as a result, high sophisticated technology was introduced in the field of maritime education and training. The use of simulator technology in training created a great responsibility for administrations and maritime institutes to determine the appropriate simulator system in order to fulfil the requirements of "approved simulator training as appropriate" as stated in STCW 95 Code, Part A, column 3.

Although the STCW Convention specified the approved performance standards governing the use of simulators in training and assessment which the member states are obliged to comply with, the convention did not specify in details the technical specifications of the approved type simulator or the qualification of instructors and assessors involved in the simulator training and assessing as required by the convention.

This paper will discuss the determination of the right simulator system in order to fulfil the requirements of STCW 95 Code, Part A, column 3, and the qualifications required for instructors and assessors in maritime institutes involved with the application of simulators.

- **Introduction**

The Radar and ARPA simulator is the only simulator training made mandatory by the STCW Convention as a method for demonstrating competence for the use of Radar and ARPA to maintain safety of navigation. However, the convention had recommended the use of approved simulator as a method of demonstrating competence in most of the other competences in the following functions:

1. Navigation
2. Cargo handling and stowage
3. Controlling the operation of the ship and care of persons
4. Marine engineering

5. Electric, electronic and control engineering
6. Maintenance and repair
7. Radio communications (GMDSS)

The question which raises itself now, how will the administration and training institutes determine the approved simulator training as appropriate? In order to answer this question, we should take into considerations the objectives of the simulator training required, the level of training required, as well as, the financial capabilities of the training institute.

STCW Convention set the performance standards for the use of simulators for training and assessment as well as the additional specific type performance standards related to the mandatory simulator training (Radar and ARPA simulator). All simulators whether mandatory or recommended have to comply with these standards if they are used in training or assessment of competence.

Moreover, the administration should ensure that all assessment of competence is continuously monitored through a quality standard system to fulfil the requirements of STCW95, Regulation A-I/8.

- **Determining the appropriate simulator system:**

In 1994 The International Maritime Simulator Forum (IMSF) was in the process of setting a system of classification and technical specification for simulators. Those standards could have been adopted and implemented by the STCW 95 Convention or at least used as guidelines to assist administrations and training institutes to comply with STCW 95 performance standards and in setting a quality standard system, but unfortunately these standards never saw the light.

The demand of simulators classification increased as the STCW 95 Convention emphasised on the role of simulators as a tool for demonstrating competences for various functions and determining competences via different training schemes.

In January 2000 The Det Norske Veritas (DNV) developed a standard for certification of maritime simulator systems, although the standards are not mandatory and the DNV as a classification society is more concerned with the certification process, documentation and the performance of the simulator than the technical training itself.

According to Cross (2002) "the main thing, from the DNV's point of view as a certifying body, is that all links and references are clearly documented. The simulator performance description will form the basis for the required test programmes for the functionality." However, those standards could be a great tool in assisting the administrations and training institutes to determine which function can be demonstrated and performed and which simulator to be obtained or to be used, as well as, to ensure that the simulation provided by the simulator include an appropriate level of physical and behavioural realism which will be reflected in the quality of competencies achieved and to monitor the operation of the simulator with the quality standards system.

The DNV has set the standards for the simulators according to their categories, which are based on the function of each simulator as follows:

1. Bridge operation simulator
2. Machinery operation simulator
3. Radio communication simulator
4. Cargo handling simulator

Each type of simulator is classified into four classes according to the simulating capabilities, which will be defined differently for each category of simulator as follow:

1. Class A (Full mission simulator)
2. Class B (Multitask simulator)
3. Class C (Limited Task simulator)
4. Class D (Special task simulator)

Each class of simulator should be capable of achieving its functions with realistic environment with reference to STCW 95 competences requirements.

The DNV standards provide a set of tables combining the class of simulator with the other factors, which is required to comply with the standards such as physical realism, behavioural realism and operating environment, in order to achieve the required competency, as well as, indicating which class of simulator is capable of achieving such competency.

The DNV standards may be considered as the foundation to produce more generic binding global standards, In order to:

1. Standardize the efficiency of training and assessment conducted by simulators,
2. Confirm the concept of global standards of maritime education and training as adopted by the STCW convention
3. To have unified interpretation for the requirement of "approved simulator training as appropriate" as stated in STCW 95 code, Part A, column 3.

- **Simulator instructors qualifications**

The qualified simulator instructor plays a very crucial role in simulator training. Currently the numbers of qualified simulator instructors are very limited taking into consideration many factors, such as the length of time since the introducing of simulator training in many institutes.

A good training strategy, if adopted, will result in having properly qualified instructors, who are considered to be the cornerstone of the simulator training:

> Experienced simulator instructors know what that it is most important at the beginning of a simulator course that users be given adequate time to familiarize themselves with the features, equipment, and operation of marine simulator as well as understanding the limitations of the specific type of simulation.

> (D.Fisher and P.Muirhead, 2001)

Qualifying and assessing the simulator instructors are the responsibility of the administrations or the training institutes according to their standards and satisfaction under the umbrella of the STCW Convention, since the Convention is not setting specific qualification for the marine simulator instructors.

According to the STCW Code, Part A, Section I/12 " Each party shall ensure that instructors and assessors are appropriately qualified and experienced for the particular types and levels of training and corresponding assessment of competence..."

Despite the fact that different institutes will set different standards of the marine simulator instructor's qualifications according to their condition and circumstances, for instance, in some regions of the world the number of qualified and experienced seafarers is rapidly decreasing. However, they will certainly agree on minimum basic requirements such as:

1. Instructors involved in simulator training have to be from the maritime community.
2. Have an operational experience relative to the type of simulator being used and his task in the training conducted.
3. Have conducted pedagogy training in use of simulators in training.
4. Have conducted technical training involving the use of the particular type of simulator being used.

- **Qualification of assessors**

According to STCW 95 Code Part A, section I/6 "Any person conducting in-service assessment of competence…if conducting assessment involving the use of simulators, have gained practical assessment on the particular type of simulator under the supervision and to the satisfaction of an experienced assessor."

Obviously an assessor will comply with the requirement of the convention doubtless if he was involved with the use of the simulator as an instructor at first. Having the same background of the instructor, the assessor can build up his skills by practice and

experience; moreover, by using the most valid and reliable method of assessment according to the levels and standards of different institutes.

According to D.Fisher and P.Muirhead (2001) "In analysing and evaluating performance, assessors will need to have established what information, activities and actions should be recorded during the assessment exercise."

The assessor has to be conversant with the assessment techniques, aware of the criteria used for assessment and capable of creating and developing evaluation scenarios and exercises.

- **Conclusions**

The use of marine simulators in training and assessment is proving their vital importance increasingly, standardizing the simulators performance is very critical demand in order to build global standards in the beneficial use of simulators as well as, complying with STCW 95 requirements.

The qualifications and skills of the instructors and assessors involved in the simulator training have to be observed vigilantly, as well as, monitored and enhanced in order to confirm the validity of the training and assessment procedures.

Finally, global standards in form of more binding specific technical regulations are required to ensure the effectiveness of the use of simulators.

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