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Training of specialists in marine crew training facilities in Ukraine using the current generation of simulators is the basis of maritime safety

1. Relevance of the article

Due to the growing shortage of maritime professionals, especially officers (estimates vary from 10.5 to 40 thousand people), the value of human resources component for the efficient and safe operation of the Navy of the world is becoming increasingly important. Quality of crew depends on a number of factors determining the level of competence.

One of the conditions for improved quality of shipboard personnel are training preparation.

The rapid development of computer and information technology in the late XX – early XXI century involved the growth of specialized educational and training center (today in Ukraine they are registered officially and there are 59 of them), carrying out practical training ranks and commanders of ships.

Ability to adequate modeling of navigation and meteorological conditions, accidents, labor interactions between ship's crew, land and services have expanded the use of simulators as within the educational standards for training specialists in schools, or in the training, retraining and advanced training of seafarers. Moreover IMO gave the definition of simulator training and introduced it to the International Convention and relevant codes of training and certification of seafarers and Watchkeeping (STCW-78). Amendments made by the IMO in 1995 and 1997, as well as resolutions of 3–14 Conference identified a number of operational requirements for trainers and for the first time in international regulatory practice introduced training and competency assessment using simulators “to maintain professionalism required by Part A of the STCW Code-78” [Convention...].

2. The purpose of the article

Highlight some aspects of the use of simulators in the training of specialists and the maritime industry in assessing their competencies to improve navigation safety and reduce accidents on the ships.

3. Statement of the material

Today it is quite obvious that an effective and high-quality training is becoming an important tool for improving the safety of navigation. As it is known, the management of marine vessel affected by both external and internal destabilizing factors. The internal concerns and human factor whose impact on safety is very important. MK STCW clear that the “standard of competence” means the level of professional training, which must be achieved for the proper performance of the vessel in accordance with the criteria agreed at international level, and includes prescribed standards or knowledge, understanding and demonstrated skills. The Convention for the competence of seafarers formed in sections A-II–A-IV STCW Code [International Convention...]. With this code in the tables of competence directly indicates the use of simulators as an instrument in the development of practical skills in the preparation of sailors, and as a staff evaluation of acquired skills with certification.

Simulation of emergency in the educational process of marine education is particularly difficult. Emergency situations are usually characterized by the unexpected appearance, unusual conditions, lack of information, the need for rapid decision-making, risk of catastrophic consequences.

Frequent occurrence of operator stress conditions during emergency situations, the appearance of gross errors, which a person does not allow under normal conditions due to the lack of specially organized training. Implementation of training in emergency conditions possible by using special exercise equipment with appropriate software, which significantly extends the simulators, including the formation of her professional skills associated with working in difficult conditions, involves overcoming malfunctions, failures, correction of errors. The need for simulators is also due to the fact that accidents occur relatively infrequently and therefore their corresponding skills and the ability not to be automated in daily activities. For the purpose that after training on a simulator observed positive transfer to practice, must comply with certain requirements for the design of the simulator, teaching of, training on it. K.K. Platonov, who in the middle of the last century developed scientific basis of the use of simulators for training pilots, sailors and other professions that involve extreme conditions, stated that not always training on the simulator provides a successful transfer to practice skills which learned in the training environment. He made a number of general requirements under which a trainer can give the expected result [Platonov, Golubev 1977]:

- Skills that are developed on the simulator, its structure must comply skills in the real world. Simple similarity simulator with real technical system may be useless if the only thing limited resemblance;
- Simulator should be capable of perceive the result of their actions. Requirement associated with implying feedback in the education system, in which a student, should see the results of their actions, and evaluate the size of nature of errors;

- Methods of work on the simulator should allow to gradually change the complexity of the problem and to provide a sufficient amount of exercise.

Marine trainers in turn, as a means of training must meet several requirements. They have a given degree of approximation showing the conditions that must take into account in their professional activities as a navigator and engineer, hydrodynamic characteristics of ships, marine environment, which is relevant to working out the operational tasks on the bridge or in the engine room. In this case, try to ensure to all actions taken as a mental and a physical nature, carried out in real time. This approach allows you to build skills in specific professional pace. This approach is justified and when is given the pace of activity can alter the way the skills and bring to a higher level than in reality. Skills worked at a higher rate, positively influencing skills at a lower rate. The increased pace of activity allows you to simulate the emotional tension characteristic of emergency. In the simulator, usually played with the actual maneuvering characteristics of the vessel, and the time performance of operational tasks should be gradually reduced and in some cases less than the time of execution of similar problems in the real world. He, who learns, must have information about how much time he spends on each attempt to perform various tasks that are repeated in training. It allows you to create professional set pace in emergency situations.

Proceeding from this, the trainer should provide the student the opportunity directly to:

- “To unroll” the structure of the system and its components;
- Change the configuration of the system depending on the given situation to him, which is a characteristic of a real external situation, or current technical state of the elements of the system;
- “Turn on” and “turn off” the system, “localizing a fault”, that is detailed to meet and absorb the normal requirements and logical justification for specific procedural actions on the real object;
- Receive information not only about the fact of a mistake, but have an opportunity to clarify what is the error of their actions and reasons [Marine navigational...: 35].

We should point out those common performance standards with respect to STCW MC simulators used in the training:

- 1) compliance with the specific goals and objectives of training;
- 2) the ability to reproduce the operational capabilities of the ship’s equipment level of physical realism that meet the objectives of training and include features, limitations and possible errors of such equipment;
- 3) sufficient behavioral realism that allows a person who is being trained, gain skills that meet the objectives of training;
- 4) monitoring operational environment that can play a variety of conditions, which may include emergency, hazardous or emergency situations related to the objectives of training;

- 5) interface by which a person who is trained, can at least interact with the hardware, reproducible environment and, consequently, the instructor;
- 6) an opportunity for the instructor to control, monitor and log the job for effective review of the problems of persons who are undergoing training.

Meanwhile STCW set operational standards for trainers, which are used during the assessment of competence, namely:

- 1) the ability to meet the specific objectives of the evaluation;
- 2) ability to play the operational capabilities of the ship equipment, which comply with the purposes of training and comprises the capabilities, limitations and possible errors of such equipment;
- 3) sufficient behavioral realism that allows candidates to demonstrate skills relevant to the purposes of assessment;
- 4) interface, with which the candidate can communicate with the hardware and reproducible environment;
- 5) controlled operational environment, capable of playing a greater variety of conditions than can include disaster, dangerous or emergency situations associated with the purposes of training;
- 6) the possibility for the teacher to control, monitor and log the job for the effective assessment of the work of the candidates for certification [International Convention...: 102–103].

The system of training specialists of the Maritime industry in Ukraine is regulated by requirements of the state standard and is functioning effectively enough [Higher education...]. However, due to the constant expansion of the nomenclature and volume of international requirements to the professionalism of the personnel necessary to develop a concept and a system of simulators use during the training, retraining, professional development and validation of competence of specialists of the Maritime profile, which would allow to promptly provide and control the level of professionalism of the Ukrainian seaman necessary for the effective operation of the domestic fleet and successful competition on the world labor market.

The main problem is solved with this approach, is to create a real national system of international quality of education, training and certification of Ukrainian seamen in accordance with the requirements of international standards of series ISO 9001-2009 [International standard...].

However, it should be emphasized that the effectiveness of proper fitness training is also largely depends on the level of students' knowledge, received by them on doctrinaires learning stage, i.e. at the stage of theoretical study modulated trainer, emergency, danger or emergency, its composition, structure and rules of operation.

This means that the most important is the question concerning the most effective technical training (TSS) for this preliminary stage of preparation of the specialist. This interest is dictated mainly by the fact that the methods and forms of

study and the applicable TSS here is essentially the same as on the stage of basic specialist training.

The most common TSS used during basic training, in spite of active introduction of information and communication systems include the following hardware:

- cinema, audio and video installation;
- epdisc, codoscope;
- demonstration models, models, samples;
- schemes, stands.

However, it is traditionally used tools typical of a number of faults, namely:

- high cost of drawing up of entire set of native content of training and technical means of their demonstration;
- weak efficiency and part of the reorganization of educational process;
- low possibility of automation educational process monitoring of educational activity of the student evaluation of effectiveness of training, management of educational process, the collection, storage and demonstration of information, which allows to combine the experience gained in this educational structure;
- their primary orientation of the mass character of education, limiting the ability to control the degree of mastering of a material of each listener;
- the difficulty or even impossibility of the use of certain kinds of teaching AIDS for individual self-study;
- the necessity of using in the process of preparation is not effective enough (information and concise and explanatory and illustrative) teaching methods;
- very poor and limited ability in development and fastening of skills needed for practical training;
- insufficient speed of accumulation of knowledge about the situation the situation on the simulator, which is studied.

Moreover, we note that the orientation of the educational process at the stages of theoretical and practical training is subordinated to the processing of practical skills-training. Here the main results and the criteria of the success of the process of preparation is under the competence requirements are noted in the tables STCW.

At the stage of preliminary study of the simulator, the listener needs to get a deeper insight into the processes of functioning of the system with subsystems one hand and models of errors produced quantities, or models fault with the other.

Efficiency of application of simulators in training of seafarers is a function of methodical (models and methods of training and institutional capacity building with the use of simulators).

The main negative effects of accounting for only estimates are:

- practical impossibility of establishing between the customer and the developer fitness equipment parity relations on the basis of strict standards in the negotiation part of the desired level (customer) effect and volume cost of providing this effect;

- the absence of a regulatory framework for solving optimization problems in the design process, and in the process the use of simulators, which differ in functions or features of the technical solution;
- practical impossibility of building a balanced assessments, which include functional, technical, organizational, methodological and economic aspects of simulators and their application in educational practice [Marine navigational...: 57].

Unloading a teacher from the routine elements of the activity, the trainer allows you to focus directly on the functional side, oriented to solution of the following tasks:

- the choice of content and methods of teaching;
- disclosure of material properties of the studied material;
- drawing up of the system tasks, taking into account individual peculiarities of each student;
- analysis of the results of the control of knowledge and skills;
- assisting in the process of reflection listener;
- the final (theoretical and practical) evaluation.

Considering the problem of the quality of trainers in marine educational establishments of Ukraine for the preparation and certification of seafarers should consider some points. Namely, that in the most difficult and responsible learning processes in this area include, for example, decision making, ship management in the conditions of navigation hazards and use of weapons by terrorists, while failures Rosina-steering equipment, power plants and other.

Traditional machines, even if they have the structural-behavioral realism and exact likeness to the consoles and control processes, have significant drawbacks. The one who trains, is here, as a rule, the subservience and passively makes its trainers program, script, little depends on his behavior and is not suitable for intelligent choice tasks solutions in conditions of uncertainty of occurrence of accidents. However difficult it possible to estimate the level of professional knowledge and skills. There is also excessive complexity of modern equipment and the limited quantity and quality modes tasks.

Efficiency of application in educational practice simulators is a function of their quality, where the quality of the simulator understand the following:

- nomenclature of waste training tasks;
- accuracy and detail reproduction of functional and physical model of the simulated simulator system;
- the quality of the information model of the simulator;
- features of engineering solutions of the problem of reproduction of the external environment and its impact on educational effectiveness of the simulator;
- flexible control simulator (stop return, repeat, varying scale and time management situations);

- automation level assessment the degree of preparedness of the listener and management of the teaching process;
- the prospect of simulators;
- reliability of the machine.

Recent developments forms of training on the simulator is based on activation shaped mechanisms of thinking and visualization not only of 3-dimensional objects and processes of their changes, as well as the different characteristics of the environment in which they operate. A good example of such developments (even not without some drawbacks when solving complex tasks in emergency situations) is a full-scale simulator integrated navigating bridge for navigators (company “Tranzas”). Its visualization system allows you to display the environment containing water, coastline, coastal objects and structures, atmospheric phenomena, effects of visibility and ambient light.

The conclusions

The integration of computer simulators in new systems for control of complex technological processes on ships in the composition of on-Board systems of information support operators will ensure the maintenance of high level of training of crews of vessels, increasing safety of navigation and reduce accidents in the Navy.

Literature

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Abstract

The article the tendency of using the simulators in the professional training of the marine branch specialists and the evaluation of their competency, which is directed for achievements and complying of the safe navigating standards.

Key words: marine branch specialists, professional competency, international marine organization (IMO), International Convention on standards of training, certification and watch keeping for seafarers (STCW), simulator training.