

користь лише в тому випадку, якщо вона цікаво вигадана, талановито втілена та вчасно представлена.

Таким чином, ефективність використання візуалізації у навчальному процесі незаперечна, оскільки сучасні учні виростають в умовах нового інформаційного середовища, сформованого масовим використанням мобільних технологій та Інтернету. Ці зміни визначають необхідність адаптації навчального процесу до їхніх психологічних особливостей.

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### INNOVATIVE TECHNOLOGIES IN MARITIME EDUCATION

The progress of digitalization opens up new opportunities for the development of skills and competencies of future maritime officers, because innovations always bring changes. This progress involves the development of new courses and the

introduction of modern teaching methods based on e-learning platforms, which must necessarily include practical training on simulators involving virtual reality. Due to the fact that the maritime industry is one of those exposed to high risk, the involvement of simulators in the training of future maritime officers is not an encouragement, but an urgent necessity.

Nevertheless, the implementation of innovative technologies in higher educational institutions faces many problems that inhibit the digitization of education: low level of pedagogical training of specialists, lack of digital teaching skills, unwillingness of teachers to get self-development or inability due to inadequate material base of the institution, inadequate competence in implementing information and communication technologies for the effective achievement of educational goals, etc.

Solving this problem requires teachers to master innovative methods and approaches within the framework of e-learning, as well as the constant self-development of digitization skills through the creation of educational content based on advanced technologies. This will make it possible to reach a qualitatively new level of education, where the teacher builds his own strategy, relying on various formats of interaction with students.

The revolution of digital technologies in education has brought to the fore two fundamental shifts that have a direct impact on pedagogical and methodical activities: increased access to information and educational materials, and introduced new ways of presenting the material, its understanding and discussion [6, p. 147].

The concept of "digitalization" in education has become synonymous with the concept of "active learning", because it means the involvement of information technologies in the educational process [3, 5] – computers, digital educational environments, mobile phones, software applications, etc. Digital technologies provide students and teachers with new opportunities for mutual development of unique ways to achieve educational goals successfully [2]. Nevertheless, "innovations in digital teaching are not only technical innovations, but rather academic, programmatic, organizational and structural ones" [4].

Thus, digital technologies contribute to development of [6, p. 12]:

- e-learning, access to educational resources, online courses;
- innovative pedagogical models;
- training on simulators (virtual reality laboratories);
- collaborative learning at the international level;
- formative evaluation of achievements in real time.

Analyzing the internal structure of "electronic learning" concept, the following sub-paradigms can be distinguished: *learning in a digital educational environment*, *mobile learning*, *deep learning*, *gamified and simulated learning*. At the same time,

learning in a digital educational environment occupies a nuclear position, because it is primarily associated with the concept of electronic learning and is widely used throughout the world, being a tool for structuring educational information and for knowledge control.

Gamified and simulated learning have a peripheral position, because within the framework of maritime education this sub-paradigm is implemented through virtual reality laboratories and simulators, which are only in the process of implementation into the curricula of leading educational institutions of Ukraine.

In terms of the educational process, the sub-paradigms of e-learning are deeply interconnected. The combinatorics of their methods in any topic should be aimed at the effective achievement of the final educational goal, meet the key principles of e-learning and motivate students to acquire knowledge independently and actively discuss outside the classroom.

The sub-paradigms of *simulated* and *gamified learning*, which are the most promising and innovative in maritime education, should be considered in more detail.

"*Simulation training*" means a mandatory component in the professional training of future specialists, which uses a model of professional activity in order to enable each student to perform a professional activity or its element in accordance with professional standards [7]. Considering the fact that future marine professionals must have a deep understanding of the complex systems on the ship, training on simulators allows a better understanding of challenges and problems awaiting them during real practice. In addition, training on simulators will help to reduce the risk of human factor failure, improve leadership and teamwork skills, promote the development of critical thinking and the decision-making process, and enable the acquisition of practical skills and knowledge of a higher level of training when performing high-risk procedures.

A special advantage of using simulators is the possibility to work out scenarios on a ship that are impossible or costly to implement in real life – emergency abandonment of a ship during the fire or explosion (abandon ship drills), emergency rescue procedure, evacuation by helicopter, etc.

*Gamification of education* contributes to the achievement of three main goals [6, p. 92]:

- learning in the process of execution / passing the course (students develop skills through doing tasks which can be repeated and learn from mistakes, have the opportunity to experiment with various scenarios of behavior that are impossible or dangerous to reproduce in real conditions);

- development of cognitive skills (simulations allow students to find new ways of educational tasks performance, creative use of acquired knowledge to solve problematic situations);

- increasing students' motivation.

The possibilities of *virtual reality (VR) technologies* in the framework of maritime education gamification have no limits. The involvement of immersive (creating the effect of presence and immersion) digitization technologies enables practical training of future maritime specialists even within the classrooms of an educational institution. These opportunities include the transition from theory to practice with an emphasis on process of visualization, means of communication and implementation of actions.

At the same time, the involvement of VR technologies includes the realization of the following functions that are not possible to realize on other simulators in real life:

- analytical (mirroring each action on the screen with the possibility of further analysis of failures);
- cognitive (accompanying the actions with the possibility of choice and the ability to self-learn);
- evaluative (controlling the execution of actions according to each scenario with hints mode);
- communicative (developing teamwork skills).

Basing on the experience of implementing the VR simulator training into maritime English teaching course [1, p. 157], it was found out that virtual learning can differ in its target orientation.

The method of ongoing passage or "learning through passing" is focused on the thorough practice of the acquired skills and includes the step-by-step passage of any operation on the vessel in accordance with the commands. Such conditions of the virtual environment are as close as possible to the real process of gaining experience on the ship, when a cadet executes direct commands and makes the necessary decisions in a controlled manner in accordance with previously formed skills. Such a passage has an unlimited number of attempts and time range. The final exam method aims to demonstrate the level of acquired competence: the student's actions are limited by time, he/she acts without prompts, relying on his/her own experience, knowledge and skills.

Also, during the final method of practicing a certain operation, the student's actions are displayed on a large screen, which allows other students to work in groups or pairs, discussing each step and commenting on the appropriateness / inadequacy of the actions in the given situation. Under this condition, the role of the teacher can be shifted to the students, who analyze and compare the performer's actions with their lexical and grammatical accuracy, fill out checklists and work on mistakes together. Thus, the pragmatic goal of training on simulators is the formation of students' competencies at two levels – conceptual and operational.

The active involvement of digital technologies during education in classrooms and outside, practice of skills on simulators, mixed use of information and

communication tools for educational purposes makes it possible to achieve the continuous education and the key principles of "active learning".

Simulated and gamified learning play a motivative role in the practical training of future maritime officers, are new and the least studied paradigms within the framework of maritime education, and their methods and techniques are almost not described in the scientific space due to the fact that the leading higher institutions of Ukraine are just starting to implement simulators and VR technologies to the academic educational process.

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