

DEVELOPMENT OF THE IDENTIFICATION SYSTEM OF CADETS' QUALIFICATION CHARACTERISTICS REGARDING STAKEHOLDER REQUIREMENTS

Mariia Masonkova, Olena Dyagileva, Pavlo Nosov
Kherson State Maritime Academy, Ukraine

Introduction. One of the most significant aspects of maintaining safety in maritime transport is the means of leveling the negative human factor of the crew on the ship [1-4]. If the indicators of fatigue and some other physiological causes of its occurrence can be eliminated through proper planning of the watch and physical activity, then the qualification characteristics require deeper research and analysis [5-7]. It is certain fragments of qualification knowledge and skills that allow a specialist to identify the situation and make the right management decision. At the same time, the difficulty is about the fact that it is not possible to eliminate the lack of necessary knowledge and skills quickly, directly on the ship [8,9]. At the same time, the complexity of the specialist's orientation in the current problem situation (difficult navigation situation; overloads in the engine room; power outages, etc.) leads to high probability of the risk of catastrophic consequences due to the human factor.

In turn, stakeholders requirements are aimed directly at leveling such dangerous manifestations on the ship, therefore, to a greater extent, this research is focused on a complex of identification tools, including simulator training and imitating virtual and augmented reality systems.

It is the qualification skills of the cadets that determine how much the stakeholders are satisfied with the training in higher educational maritime institutions. At the same time, the most important thing for stakeholders is how quickly the cadet adapts within the framework of the position held regarding his specialization. The faster the adaptation takes place, the more effective the strategy of maritime specialists training is.

The main material of the study. Based on the above problems, there is a research hypothesis - the elimination of the human factor leading to disorientation of a specialist when analyzing the situation while on watch can be eliminated with the help of automated systems of integrated management by formation of qualification elements.

In particular, according to the proposed hypothesis, in order to timely prevent negative manifestations of the human factor, it is necessary to develop a system that allows accumulating data and knowledge about the course of the qualification elements formation during simulator training within the framework of IMO-model courses. According to this the system being developed is supposed to be based on three interrelated subsystems: a subsystem for collecting data-results of cadets' educational activities; subsystem for automated analysis of cadet actions during simulator training; a subsystem for predicting negative manifestations of the human factor on a ship by means of data analysis of the first and second subsystems.

The first subsystem assumes the data synthesis during the learning process. It is planned to develop a method for deriving an integral indicator of cadet's educational activity in the context of specialty. Depending on the investigated factor of influence on the situation, the weight coefficients affecting the integral indicator may be different. An important point is the determination of the functional dependence in relation to the indicator and the influencing factors that determine the situation and the adoption of managing decisions by specialist.

The second subsystem assumes an intelligent analysis of the trajectory of cadet's behavior in the process of performing tasks using simulators. Depending on the specialization, the specificity and direction of the tasks may be different: navigation and ship handling at sea; management of ship technical systems and complexes; ship electrical equipment and automatic devices operation. At the

same time in certain situations there can be considered tasks common to each specialization. The complexity of data collection within the framework of the second subsystem is that it becomes necessary to build an individual model of behavior for each cadet. It is the individualization of the processes of situations perception for making decisions in the course of simulator training that makes adjustments to analyze the compliance of each specialist regarding stakeholder requirements.

It is assumed that development of the third subsystem on the basis of the data and model of each maritime transport specialist will allow at the early stages to predict the trajectory of the development of qualification characteristics in time. The complexity of this subsystem is that it is necessary to determine not only the vectors of the formation of qualification characteristics regarding stakeholder requirements within the framework of specialization, but also individual temporal characteristics, depending on the psychological characteristics of cadets.

Thus, the system for identifying cadets' qualification characteristics assumes the following schematic interpretation (Fig. 1).

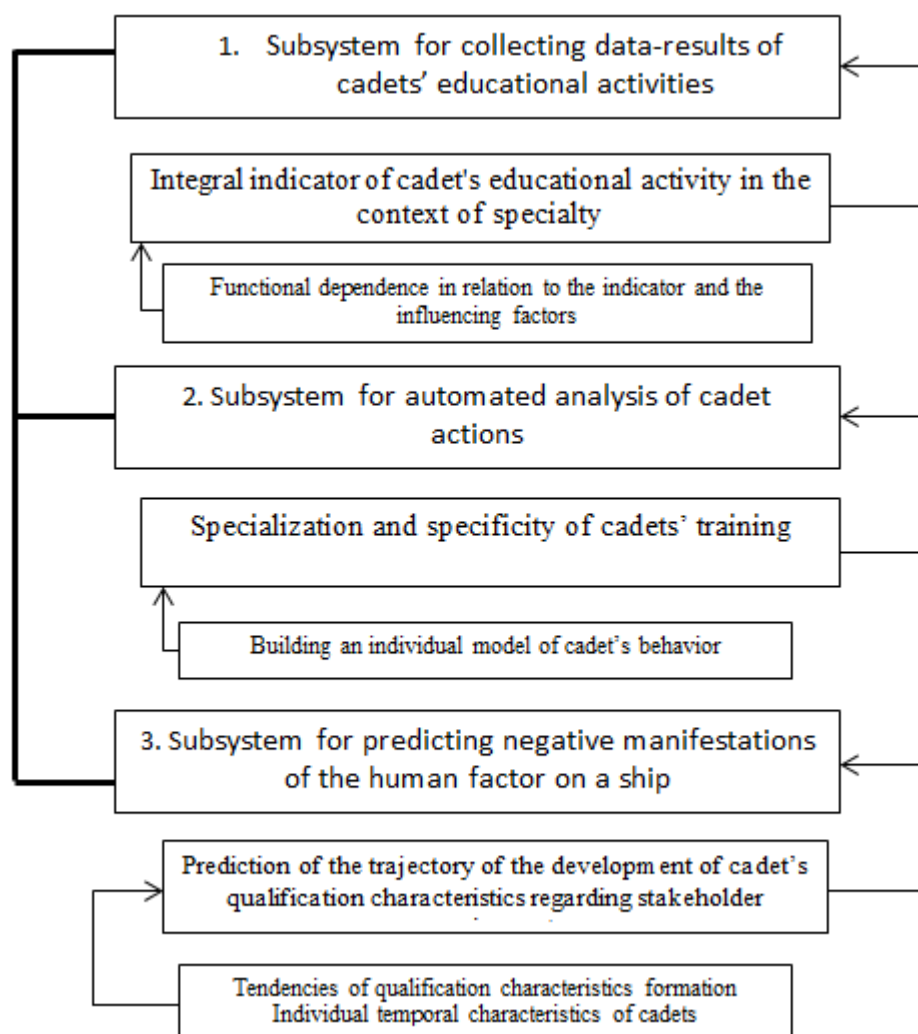


Figure 1 – Scheme of identifying cadets' qualification characteristics

Conclusion. According to the proposed scheme, the sequence of extraction and analysis of data and knowledge about the formation of qualification characteristics has been determined. Subsequent researches assume building a database structure for complex data analysis in order to determine the most significant factors affecting the final result of educational activities in the context of stakeholder requirements. This working-out will allow to identify hidden trends in the formation of

qualification characteristics elements and to prevent the development of those that contribute to the manifestations of a negative human factor in the practice of sea transport operation.

REFERENCES

1. Nosov P., Ben A., Safonova A., Palamarchuk I. Approaches going to determination periods of the human factor of navigators during supernumerary situations // *Radio Electronics, Computer Science, Control* № 2(49). - 2019. Pages 140-150. DOI:10.15588/1607-3274-2019-2-15.
2. Popovych, I. S., Cherniavskiy, V. V., Dudchenko, S. V., Zinchenko, S. M., Nosov, P. S., Yevdokimova, O. O., Burak, O. O. & Mateichuk, V. M. (2020). Experimental Research of Effective “The Ship’s Captain and the Pilot” Interaction Formation by Means of Training Technologies. *Revista ESPACIOS*, Vol. 41(№11). Page 30.
3. Nosov P.S., Popovych I.S., Cherniavskiy V.V., Zinchenko S.M., Prokopchuk Y.A., Makarchuk D.V. Automated identification of an operator anticipation on marine transport // *Radio Electronics, Computer Science, Control*, 2020. - № 3. – P 158-172. DOI:10.15588/1607-3274-2020-3-15.
4. Nosov P.S., Zinchenko S.M., Popovych I.S., Ben A.P., Nahrybelnyi Y.A., Mateichuk V.M. Diagnostic system of perception of navigation danger when implementation complicated maneuvers // *Radio Electronics, Computer Science, Control*, 2020. - № 1. – P146-161. DOI:10.15588/1607-3274-2020-1-15.
5. Cherniavskiy, V., Popova, H., Sherman, M., Voloshynov, S., Yurzhenko, A. (2020). Mixed reality technologies as a tool to form professional competency of sea transport professionals. *CEUR Workshop Proceedings*, 2740, P. 217–231.
6. Mokrane Fedila. Appropriateness of problem based learning in maritime education and training (2007). World Maritime University. The Maritime Commons: Digital Repository of the World Maritime University. Dissertation. Malmö, Sweden.
7. Носов П.С., Тонконогий В.М. 3D оценивание траектории обучения студента // *Тр. Одес. политехн. ун-та. — Одесса: ОНПУ*, 2007. – Вып. 2(28).– С. 129-131.
8. Nosov, P., Ben, A., Zinchenko, S., Popovych, I., Mateichuk, V., Nosova, H.: Formal approaches to identify cadet fatigue factors by means of marine navigation simulators. *CEUR Workshop Proceedings*, 2732, 823-838 (2020).
9. Serhii Zinchenko, Oleh Tovstokoryi, Pavlo Nosov, Ihor Popovych, Vitaliy Kobets, Gennadii Abramov. Mathematical support of the vessel information and risk control systems P. 335-354. // *CEUR Workshop Proceedings*, 2805. <http://ceur-ws.org/Vol-2805/paper25.pdf>.