The need to enhance the quality of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime educational institutions (hereinafter - HMEI) is substantiated by the fact that in the modern globalized world water transport, due to its advantages, provides about 70% of international trade and in the island states - Great Britain, Japan and Australia - almost 100%. Now the international labor market has formed in world shipping, where Ukraine, according to statistics, is among the top ten countries in terms of the number of naval officers. Ukraine is one of the largest countries-suppliers of labor to the world labor market of seafarers. It is also important that the employment of ship command personnel in shipping companies is not only prestigious, but also economically profitable for Ukraine. The knowledge and skills acquired during their studies provide HMEI graduates with the opportunity to operate any modern vessels. The relevance of the study is reinforced by the fact that the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (1978), (hereinafter - STCW), "Treaty text of the maritime labor convention" (2006) require educational institutions and shipping companies to monitor the standards of training ship crew members, analyze the quality of their assimilation of knowledge and skills, ensure organization of retraining and advanced training courses, etc.

The Manila amendments (2010) to the STCW provide that the effectiveness of seafarers' training processes can only be assessed on the basis of the skills, abilities and competence demonstrated by a maritime transport specialist while working on a ship. The importance of training future specialists in navigation and management of sea vessels (future boatmasters) for professional activities is also highlighted in national regulatory documents. In particular, the "Merchant shipping code of Ukraine" (1995), the Resolution of the Cabinet of Ministers of Ukraine "On approval of the regulations on the rank of persons of command of sea vessels and the procedure for their assignment" (2013), as well as educational and professional training programs for future specialists in navigation and management of sea vessels in the Navy determine the need to introduce modern educational technologies. These documents require that future boatmasters possess modern methods and forms of organizing work on ships, master professional skills and skills of working in real conditions of professional activity, be able to make independent decisions, solve problems and work in a team, be ready for overloads and stressful situations, that is, possess all necessary competencies provided for by STCW.
At the same time, the traditional system of training future boatmasters requires significant updating, because in connection to new challenges and threats in the field of navigation in modern conditions it’s mandatory to perform careful analysis of the learning outcomes - knowledge, skills, ways of thinking, value orientations, professionally important properties of specialists in navigation and vessel control, which they must possess after completing their training at the maritime institutions of higher education. The content of professional training of future boatmasters, forms, methods and techniques of forming readiness for professional activity also need to be revised.


However, there hasn’t been conducted a comprehensive study of the system of continuous training of future specialists in navigation and management of sea vessels. The pedagogical conditions for the formation of readiness of future boatmasters for professional activity in the system of continuous professional training and the corresponding technology of their implementation, taking into account the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (1978) haven’t been elaborated and implemented in the educational process of HMEI.

The results of the analysis of professional training of future specialists in navigation and management of sea vessels also adds to the relevance of the topic. Data from the pilot study indicate that students receive insufficient amount of theoretical knowledge and do not acquire a minimum level of skills and abilities - the basis of professional competence. The system of training specialists in river and sea transport does not fully meet modern requirements of the labor market and does not provide a balance of needs and offers. A decrease in the quality of scientific and pedagogical potential is quite noticeable and updating of scientific and methodological base is insufficient. These drawbacks lead to a decrease in the quality of education, a weakening of the motivation of cadets (students) to study, the links with labor market and, in general, competitiveness of Ukrainian HMEI and their graduates.

**RESEARCH PROBLEM**

Taking into account the results of scientific research of Bodrov (2001), Didenko (2021), Balendr (2021), Chichikin (2016), Soroka (2019) and others, requirements and content of regulatory documents in the field of maritime education, educational programs, International Convention on standards of Training, Certification and Watchkeeping for Seafarers (1978), it is concluded that the readiness of future boatmasters for professional activity is a personal property of a specialist acquired in the process of continuous professional training, covering professional motives, value orientations, a set of general and special knowledge, professionally important properties, understanding, skills and abilities in the field of navigation and management of sea vessels, which in integration provide the ability to perform professional activity in the specialty and further professional development.

The results of the analysis of professional training of future boatmasters, as well as the data of a pilot study, indicate that students in HMEI receive insufficient amount of theoretical knowledge and do not acquire a sufficient level of skills and abilities - the basis of readiness for professional activity. It is also established that the system of training specialists in navigation
and management of sea vessels does not fully meet the modern requirements of the labor market, does not provide a balance of needs and offers. A decrease in the quality of scientific and pedagogical potential is quite noticeable. We have to note slow updating of the scientific and methodological base and introduction of new management methods in the practice of HMEI activities. These drawbacks lead to a decrease in the quality of education, a weakening of the motivation of cadets (students) to study, the links with labor market and, in general, competitiveness of Ukrainian HMEI and their graduates. In addition, the results of the analysis of professional training of future boatmasters for professional activities allow us to state that there are contradictions:

1. between the state of professional readiness of HMEI graduates - future shift assistants to the captain, senior assistants to the captain and captains and the modern requirements of the Navy, the needs of world commercial navigation regarding the quality of training boatmasters;

2. increasing requirements of international and national quality standards for the professional competence of specialists in navigation and management of sea vessels and insufficient level of appropriate scientific and methodological support for their professional training;

3. limited didactic capabilities of educational and material base of professional training of cadets (students) in the HMEI and rapid pace of updating equipment and ship controls;

4. requirements of international standards for the professional competence of specialists in the field of navigation and management of sea vessels and insufficient development of objective criteria for assessing students’ academic achievements during professional training in the HMEI.

The need to overcome these contradictions, as well as insufficient theoretical development and practical significance of solving the problem of improving the professional training of future specialists in navigation and ship management, led to the purpose of the article - to substantiate the technology of continuous professional training of future boatmasters in the HMEI and publish the results of experimental verification of its effectiveness.

**RESEARCH METHODS**

The study involved conducting a pedagogical experiment, which consisted of two stages: ascertaining and forming. The ascertaining stage of the experiment was conducted in the first quarter of 2015. The main tasks of this stage of research was to find out the level of formation of readiness of future boatmasters for professional activity, to determine trends in this process in domestic HMEI, to study the content of curricula and work programs of academic disciplines that cadets study at different courses in specialty 271 "River and sea transport" in the specialization "Navigation" ("Navigation and management of sea vessels").

The ascertaining stage of the experiment included students of the National University "Odessa Maritime Academy" (NU "OMA"), the Danube Institute (DI NU "OMA"), the Kherson State Maritime Academy (KHSMU), the Kyiv State Academy of Water Transport of the State University of Infrastructure and Technology. In total, at the ascertaining stage of the experiment, 228 students of the final year of the first (Bachelor’s) level of higher education and 102 students who completed their studies at the Specialist and Master’s level were interviewed. 35 teachers of these HMEI were also involved in conducting experimental activities in order to clarify their ideas about the quality and content of training of future boatmasters, their understanding of modern requirements of international regulations, reserves and opportunities of the educational process for the formation of readiness of future boatmasters for professional activities, readiness of the teaching staff to form professional qualities, value orientations, attitudes of future specialists in navigation and management of sea vessels.

The formative stage of the pedagogical experiment lasted from May 2015 to May 2019. Its goal was to create conditions for testing the technology of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime educational institutions. The formative stage of the pedagogical experiment was organized on the basis of
NU “OMA”, including its branches – the Azov Maritime Institute and the Danube Institute. This stage of the pedagogical experiment had a parallel character, which provided for the participation of homogeneous objects, that is, two groups - experimental (hereinafter – EG) and control (hereinafter – CG). The participants of the EG were actively influenced by introduction of author’s technology, and in the CG the educational process was organized according to the traditional system. By comparing the state of objects (EG and CG), in particular the input (at the beginning of the experiment) and final (after its completion) characteristics of the formation of readiness for professional activity of future boatmasters, the effectiveness of the proposed measures, in particular the technology of continuous professional training of future boatmasters in the HMEI was determined.

Before starting the organization of experimental work, the composition of the experiment participants was determined, and they were familiarized with the tasks of the experiment. The total number of participants at the formative stage of the experiment was 288 students who studied at the first (Bachelor’s) level of higher education, 84 students who studied at the second (Master’s) level of higher education, as well as 48 research and teaching staff of NU “OMA” and its branches - the Azov Maritime Institute and the Danube Institute. To determine the criteria and indicators of readiness of future boatmasters for professional activity, the results of research by scientists (DIDENKO and POLISHCHUK, 2009; FETISKIN et al., 2009; BALENDR et al., 2018, 2019) were taken into account, in which it is proposed to measure the formation of readiness for professional activity based on the assessment of the manifestations of its components, taking into account certain indicators. So, the criteria of readiness of future boatmasters for professional activity in accordance with its structure have been defined:

- need-motivational (serves to diagnose the motivational component);
- value-orientational (designed to diagnose the value component);
- cognitive (used to diagnose the information component);
- professional and personal (used to find out formation of the psychological component);
- practical (used for diagnostics of the operational component) criteria.

As for the tools, thanks to the quantitative data obtained, the need-motivational criterion for the readiness of future boatmasters for professional activity was used:

- methodology for determining interest in the profession, the level of professional orientation, (DUBOVTSKA, 2004);
- “Methodology for determining motivation of learning” (DIDENKO and POLISHCHUK, 2009);
- Methodology for determining the need for self-development, self-education and self-improvement (FETISKIN et al., 2009);
- Method of “Diagnostics of the level of self-demand” (FETISKIN et al., 2009);
- Questionnaire of professional orientation by Goland (DIDENKO and POLISHCHUK, 2009).

To obtain quantitative data on indicators of the value-orientational criterion of readiness of future boatmasters for professional activity, it was used:

- Methodology of “Value Orientations” by Rokich modified by Leontiev (2000) for studying the levels of structure of the system of value orientations (GREBEN, 2007);
- The Test Sense of Life Orientations (SLO), developed by Leontiev to determine the general indicator of life consciousness, in particular the purpose of life, the process of life, the effectiveness of life, as well as two aspects of the locus of control (LEONTIEV, 2000);
• methodology for studying the true value orientations of the individual by Bubnova for the study of the concept of value orientations as a system-forming factor of personality (BUBNOVA, 1995);
• questionnaire of the need for achievements by Orlova (2009), designed to study the main characteristics of the motivational and need sphere (DIDENKO and POLISHCHUK, 2009);
• methodology for determining the group cohesion index by Syshor (FETISKIN et al., 2009);
• the method of monitoring the actions of cadets in various situations of educational activities and marine practice.

To obtain quantitative data on indicators of the cognitive criterion, we used the results of evaluating written and oral surveys, performing tests, solving situational problems, as well as the method of monitoring the actions of cadets in various situations of educational activities and marine practice. These methods of testing knowledge are used in the usual forms of organizing the educational process (during lectures, seminars, practical and laboratory classes) and in special classes organized for the purpose of assessment (colloquiums, defense of term papers and theses, tests and exams). To obtain quantitative data on indicators of the professional and personal criterion, we used:

• a questionnaire method for assessing students' attitude to the requirements of the profession, the specifics of interaction with other specialists and team members, and so on (BALENDR, 2018);
• personal questionnaires of the motivational orientation of the individual to achieve success and avoid failures by Elers (FETISKIN et al., 2009);
• multi-factor questionnaire of personality by Cattell (to identify isolation-sociability, emotional stability-instability, subordination-dominance, timidity-courage, etc.) (DIDENKO and POLISHCHUK, 2009);
• Eysenck MPI test (to determine the degree of stability or instability (neuroticism) of nervous processes and the extraversion-introversion ratio);
• LOG Pommep scale (to determine the tendency of a person to attribute the reasons for their achievements and failures to various factors: external, independent of it, or their own, internal);
• Test by Leonhard (to identify character accentuation);
• Thomas test (to determine the style of behavior in a conflict);
• timekeeping of activities or indirect monitoring (to measure the time of work operations and the duration of individual stages of activity in order to determine and evaluate the ability of a specialist to the intensity and intense nature of the work process);
• analysis of erroneous actions (to systematize and interpret errors in activities, find out their causes and consequences, analyze the role of psychological factors in the occurrence of errors, etc.).

To obtain quantitative data on indicators of the value-orientational criterion of readiness of future boatmasters for professional activity, we used:

• assessment of the performance of practical work, algorithm and correctness of cadets’ actions during their participation in role-playing, working in small groups, project work, practical classes, actions in specific cases (cases), portfolio of works;
• testing;
• written and oral survey;
• performing control works;
• the method of monitoring the actions of cadets in various situations of educational process and marine practice;
• timekeeping of activities;
• method for analyzing erroneous actions.

**RESEARCH RESULTS**

The results of experimental and analytical activities allowed us to find out that it is advisable to consider readiness for professional activity as the result of continuous professional training of future boatmasters at the HMEI. According to the data of scientific literature on the problem of research, as well as taking into account the individual psychological characteristics and state of professional development of students, the level and content of education in the HMEI, the features of the organization of practical training at various training courses, as well as the features of the educational process in the HMEI, it was suggested that continuous professional training of future specialists in navigation and management of sea vessels in higher marine educational institutions should take place according to the technology that encompasses four stages.

The first - initial stage has time limits from admission to the HMEI and lasts during the first year of study. At this stage, there was an active influence on the motivational, value and information components of readiness for professional activities, which implies a clear understanding by first-year cadets of the features of professional activity, a stable positive attitude and a stable interest in it and in the process of professional training, strengthening motivation to obtain professional knowledge in the field of navigation, demonstrating the role of theoretical knowledge in professional activities, promoting awareness of the need to obtain them, and so on. An important result of the first year of study at the HMEI was assimilation by cadets (students) of the functions of a sailor of the 2nd Class.

The second stage - in-depth training is aimed at formation of information, psychological and operational components of the readiness of future boatmasters for professional activities, which involves mastering a set of general and special knowledge, moral and psychological readiness for activities, professionally important properties, skills and abilities that ensure the performance of professional functions, as well as methods and techniques for performing professional activities. This stage covers the second year of training and involves future boatmasters mastering the functions of a 1st-class sailor.

The third stage - integration of theoretical and practical training covers the third and fourth courses of training and provides for in-depth formation and development of the content of all components of readiness of future boatmasters for professional activities (motivational, value and information, psychological and operational). At this stage, it is planned to implement generalization and deepening of knowledge on an interdisciplinary basis, as well as the formation of practical skills for future boatmasters. This stage provides for preparation for the state exam and certification, as well as compliance with the requirements of standards for competencies, defined as mandatory by the rules II/1, II/2 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (1978). At this stage of training it also provides for the completion of the requirements for practical training of boatmasters established by Rule II/1 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (1978), as well as obtaining the necessary sailing experience, duties and responsibilities of a watch assistant captain, taking into account the guidance given in Section B – II/1 of the STCW.

The fourth stage - the stage of professional development covers the period of training in the Master's program, provides for compliance with the requirements of the standards for formed competencies established in Section A-II/2 of the Code for training and certification of seafarers and watch keeping, as amended, allowing graduates to hold positions at sea and river vessels in navigation and management of sea vessels, work at enterprises, institutions and organizations that ensure operation of the fleet, ship traffic management and safety of navigation, in particular the positions of navigator, chief navigator, watch assistant, senior assistant captain, captain, chief captain, chief captain-coordinator, engineer-dispatcher for fleet traffic.
The next stage of the research work was the search for pedagogical conditions, the introduction of which in the process of continuous professional training of future boatmasters will ensure the effective formation of their readiness for professional activities. To determine the pedagogical conditions, the scientific and theoretical foundations of training future specialists for professional activities in the national higher education institutions, the results of scientific research, generalization of historical and foreign experience in training marine industry specialists for professional activities, data on monitoring and diagnostics of readiness of future boatmasters for professional activities at the stage of ascertaining experiment were taken into account. Based on the results of analytical and search activities, the study determined that continuous professional training of future specialists in navigation and management of sea vessels in higher maritime institutions will be effective if the following pedagogical conditions are introduced at each stage of this process:

- at the first-initial stage: the formation of a conscious understanding by students of the need to master the disciplines of all training cycles provided for in the educational program; psychological and pedagogical support of students’ adaptation to study in the HMEI and during swimming practice on ships of the Navy; formation and development of professional value orientations of future boatmasters using the potential of the content of disciplines of the cycle of humanitarian and socio-economic training, as well as training swimming practice;

- at the second stage of in-depth training: introduction of innovative methods and forms of training and teaching in order to activate students to develop professionally significant personal properties; development of psychological readiness of future boatmasters to make managerial decisions and keep watch by integrating into the educational and professional program of an additional course based on an interdisciplinary approach;

- at the third stage of integration of theoretical and practical training: design and implementation in the educational and professional program of a special course for in-depth study of the features of river navigation; preparation of future boatmasters for professional intercultural communication as part of multiethnic and multicultural ship crews;

- at the fourth stage of professional development: development of the ability of cadets (students) of higher education institutions to lead and achieve personally significant goals; development of motivation for independent research activities of students in the master’s program.

At the same time, the study also suggests introducing pedagogical conditions that have a cross-cutting impact on all four stages of continuous professional training of future specialists in navigation and management of marine vessels in higher maritime institutions. In particular, we are talking about the following pedagogical conditions: strengthening the practice-orientation of the educational process in HMEI by introducing a cross-cutting program of practical training; designing the goals, objectives and results of step-by-step training of future boatmasters from Sailor 2nd Class to Navigator taking into account the requirements of STCW; simulation modeling of situations that reproduce as close as possible to real conditions of ship’s watch based on the use of information and communication technologies and complexes; scientific and methodological support for the development of professional competence of teaching staff to form the readiness of future boatmasters for professional training; regular monitoring of the quality of formation of readiness of future boatmasters for professional activity.

In order to introduce the technology of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime institutions, appropriate changes were made to the organization of the educational process for EG students. These changes provided for the use of the following pedagogical techniques at the first stage: informality (teachers told students about their own mistakes, experience, decisions made and their consequences), provocation (short-term challenge of students’ reaction of disagreement
with the information that is being taught to prepare the audience for the perception of constructive conclusions, clarification of opinions, dramatization and hyperbolization (for example, in the disciplines “Safety and Security at Sea”, “Practice of keeping a navigator’s watch”, “Prevention of ship collisions and the use of radar stations and automated radar laying” teachers consciously dramatized the events at sea, clearly and enthusiastically depicted emergencies and emergency events, which enriched the content of classes so that students identified themselves with the actors and life situations).

Also it was important to discuss the problems of navigation, issues of organizing collective activity and leadership, which allowed students to better understand the spirit of the corporate culture of maritime transport specialists. Cooperation between teachers and students in the process of professional training contributed to the awareness of future boatmasters of their own axiological position.

Among the innovative methods and forms of training and teaching at the second stage were in-depth training of future boatmasters, case technologies, the “round table” method, debates, case-study, trainings, video conferences, “brainstorming”, focus groups, role-playing games, group discussions, project-based method. In addition, EG students were involved in such forms of training organization as e-learning (e-learning that offers the use of internet technologies, electronic libraries, educational and methodical multimedia materials, virtual laboratories and workshops, etc.); m-learning (mobile learning that involves the transfer of knowledge to mobile devices); u-learning (all-pervading learning - technologies of continuous learning using information and communication tools.

At the second stage, an additional course was also introduced to develop the psychological readiness of future boatmasters to make managerial decisions and keep watch. It was implemented by integrating it into the educational and professional training program for future specialists based on an interdisciplinary approach. At the third stage of continuous professional training of future specialists in navigation and management of sea vessels, the main efforts of the organizers of the formative stage of the experiment were also aimed at preparing students for professional intercultural communication as part of multi-ethnic and multicultural ship crews. For this purpose, the potential of such academic disciplines as "Organization of collective activities and leadership", "English (professionally oriented)", as well as the potential of swimming practice were used.

At the fourth stage of the author’s technology - the stage of professional development, the main efforts of the organizers of experimental training were aimed at developing the ability of HMEI students to lead and achieve personally significant goals. This work was organized taking into account three main approaches to leadership development - from the point of view of personal property development, from the point of view of leadership behavior formation and situational approach. During classes with students in the discipline "Organization of collective action and leadership", the actions of Navy officers, their decisions, leadership styles were carefully considered and analyzed, and cadets identified them in various situations. Future boatmasters had to justify the correctness or fallacy of these decisions, and then make sure how correct they turned out to be when they learned about the true circumstances of the situations given by the teachers.

Consequently, at each stage of the technology of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime institutions, in order to increase the effectiveness of this process, certain pedagogical conditions were implemented. At the same time, during the formative stage of the experiment, pedagogical conditions were introduced that had a cross-cutting impact, that is, they were implemented during all four stages. For example, the strengthening of the practice-orientation of the educational process in the HMEI was implemented by introducing a cross-cutting program of practical training. This is the main educational and methodological document regulating the purpose, content and sequence of practical training, summing up results and contains recommendations on the types, forms and methods of quality control of training (level of knowledge, skills and abilities) that students receive during practical training to achieve the standard of competences in accordance with STCW. In general, the entire swimming practice was divided into three types: training swimming practice (at the first stage of forming the
readiness of future boatmasters for professional activity), industrial swimming practice (at the second stage) and pre-certification swimming practice (at the third stage).

At the final stage of the study of the effectiveness of the technology of continuous professional training of future boatmasters in the HMEI, the level of training of students in the experimental group was re-diagnosed and compared with similar data in the control group according to certain criteria and their indicators. The computer program "IBM® SPSS Statistics®" was used to summarize and process the obtained data. This made it possible to build two tables - with a distribution by the levels of formation of readiness of future boatmasters for professional activity in points. Summary tables with generalized results obtained according to certain criteria at the beginning and end of the forming stage of the experiment are presented in Tables 1 and 2.

**Table 1** - Average scores on indicators of readiness criteria of future boatmasters of the first (Bachelor) level of higher education to professional activity at the beginning and at the end of the forming stage of the experiment in CG 1 (n = 143) and EG 1 (n = 145).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>At the beginning</th>
<th>At the end</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG 1</td>
<td>EG 1</td>
</tr>
<tr>
<td>Need-based and motivation</td>
<td>3.892</td>
<td>3.874</td>
</tr>
<tr>
<td></td>
<td>4.086</td>
<td>4.338</td>
</tr>
<tr>
<td>Value-orientational</td>
<td>3.846</td>
<td>3.841</td>
</tr>
<tr>
<td></td>
<td>4.019</td>
<td>4.340</td>
</tr>
<tr>
<td>Cognitive</td>
<td>3.731</td>
<td>3.767</td>
</tr>
<tr>
<td></td>
<td>3.954</td>
<td>4.219</td>
</tr>
<tr>
<td>Professional and personal</td>
<td>3.817</td>
<td>3.798</td>
</tr>
<tr>
<td></td>
<td>4.015</td>
<td>4.215</td>
</tr>
<tr>
<td>Practical</td>
<td>3.728</td>
<td>3.712</td>
</tr>
<tr>
<td></td>
<td>3.952</td>
<td>4.268</td>
</tr>
<tr>
<td>Generalized criterion</td>
<td>3.802</td>
<td>3.798</td>
</tr>
<tr>
<td></td>
<td>4.005</td>
<td>4.276</td>
</tr>
</tbody>
</table>

Source: Search data.

**Table 2** - Average scores according to the criteria of readiness of future boatmasters of the second (Master’s) level of higher education for professional activity at the beginning and end of the formative stage of the experiment in CG 2 (n = 42) and EG 2 (n = 43)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>At the beginning</th>
<th>At the end</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG 2</td>
<td>EG 2</td>
</tr>
<tr>
<td>Need-based and motivation</td>
<td>3.995</td>
<td>3.979</td>
</tr>
<tr>
<td></td>
<td>4.154</td>
<td>4.456</td>
</tr>
<tr>
<td>Value-orientational</td>
<td>3.948</td>
<td>3.928</td>
</tr>
<tr>
<td></td>
<td>4.105</td>
<td>4.360</td>
</tr>
<tr>
<td>Cognitive</td>
<td>3.981</td>
<td>3.995</td>
</tr>
<tr>
<td></td>
<td>4.180</td>
<td>4.474</td>
</tr>
<tr>
<td>Professional and personal</td>
<td>3.889</td>
<td>3.878</td>
</tr>
<tr>
<td></td>
<td>4.083</td>
<td>4.343</td>
</tr>
<tr>
<td>Practical</td>
<td>3.878</td>
<td>3.862</td>
</tr>
<tr>
<td></td>
<td>4.071</td>
<td>4.325</td>
</tr>
<tr>
<td>Generalized criterion</td>
<td>3.938</td>
<td>3.928</td>
</tr>
<tr>
<td></td>
<td>4.118</td>
<td>4.391</td>
</tr>
</tbody>
</table>

Source: Search data.

Comparison of the values of the generalized criteria before and after the formative stage of the experiment shows that the experimental measures taken from September 2015 to April 2019, and the introduction of technology for continuous professional training of future specialists in navigation and management of sea vessels in higher maritime institutions during four stages positively affected the quality of student training. So, for example, the value of the average points of the generalized criterion of readiness of future boatmasters of the first (Bachelor’s) level of higher education for professional activity at the beginning and end of the formative stage of the experiment increased in CG 1 by 0.203 points (about 5.5%), and EG 1 - by 0.478 points (by 12.5 %).

**CONCLUSIONS**

In order to confirm the differences in the qualitative composition of CG 1 and EG 1, for all criteria of readiness of future boatmasters for professional activity, the Student’s t-criterion was applied at the end of the formative experiment, which serves to compare the two empirical distributions (Table 3).
Table 3 - Results of the study of the formation of future boatmasters’ readiness for professional activity at the end of the forming experiment in CG 1 (n = 143) and EG 1 (n = 145)

<table>
<thead>
<tr>
<th>Criterion of readiness of future boatmasters for professional activity</th>
<th>Samples</th>
<th>Deviation from the average</th>
<th>The squared deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG 1 (X)</td>
<td>EG 1 (Y)</td>
<td>(\sum(x-x))</td>
</tr>
<tr>
<td>Need-based and motivation</td>
<td>4.086</td>
<td>4.338</td>
<td>0.076</td>
</tr>
<tr>
<td>Value-orientational</td>
<td>4.019</td>
<td>4.340</td>
<td>0.009</td>
</tr>
<tr>
<td>Cognitive</td>
<td>3.954</td>
<td>4.219</td>
<td>-0.056</td>
</tr>
<tr>
<td>Professional and personal</td>
<td>4.015</td>
<td>4.215</td>
<td>0.005</td>
</tr>
<tr>
<td>Practical</td>
<td>3.952</td>
<td>4.268</td>
<td>-0.058</td>
</tr>
<tr>
<td>Generalized criterion</td>
<td>4.005</td>
<td>4.276</td>
<td>-0.005</td>
</tr>
<tr>
<td>Sum</td>
<td>24.031</td>
<td>25.656</td>
<td>-0.029</td>
</tr>
<tr>
<td>Average</td>
<td>4.01</td>
<td>4.28</td>
<td></td>
</tr>
</tbody>
</table>

Source: Search data.

So, level \(t_{emp} = 9\). By special sums for a given number of degrees of freedom, we find \(t_p : t_p = 2.23\) in terms of significance of \(p \leq 0.05\). Building the "significance axis" (Figure 1).

Figure 1 - Diagram of the "significance axis" based on calculations of the Student's parametric t-criterion for all criteria of readiness of future boatmasters for professional activity in CG 1 (n = 143) and EG 1 (n = 145)

Source: Search data.

In terms of mathematical statistics, the calculations and scheme can be explained as follows: there are significant differences between CG 1 and EG 1 of future boatmasters in determining the level of formation of readiness for professional activity according to all criteria. Similar calculations were made for CG 2 and EG 2 (students who studied at the second - Master’s level of higher education) according to all criteria. The study of the formation of value orientations of future boatmasters showed an increase in the value attitude to the main professional values, including "profession that brings pleasure", "career", "professionalism", "intellectual development", "self-realization", "preservation of the environment", "compliance with safety rules, safety of personnel and ship", "ship survivability", "safety of ship, crew and passengers".

The study of the formation of skills of future boatmasters also indicates higher scores among students of the EG compared to CG regarding the ability to maneuver and control the ship in any conditions with the use of appropriate methods of location determination, as well as with the use of modern electronic radar means; the ability to plan a flight and carry out navigation in any conditions with the use of appropriate methods of laying sea and ocean routes; the ability to assess navigation information obtained from all sources, in particular radar, means of automated radar laying and electronic complexes of the navigation and Information System.

After the experimental training, there were positive changes in the formation of knowledge, skills and abilities of students of graduates of the second (Master’s) level of higher education. In particular, higher values of points are stated compared to the control group regarding the ability to manage personnel on the ship and its training, apply methods of managing tasks and workload of personnel, the ability to maneuver and control the ship in any conditions, establish procedures for safe handling of goods, including dangerous ones, in accordance with the
provisions of relevant regulatory documents, as well as the ability to determine the location and accuracy of the results of determining the location of the ship in any conditions in various ways. It is especially worth noting the development of the ability to solve complex problems and problems in the field of navigation safety, in conditions of incomplete or insufficient information and conflicting requirements, to conduct research and / or use new concepts, theories and methods in the professional sphere. So, the results of experimental work on experimental verification of the effectiveness of the technology of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime institutions confirmed the correctness of the hypothesis put forward.

REFERENCES


SOROKA, O.; KALAUR, S. & BALENDR, A. Diagnostics of leadership qualities of specialists of "man- man" type of professions in military and civil higher education institutions: Psychological and pedagogical approach. *Revista Romaneasca pentru Educatie Multidimensional*, 2019, 11(4S1), 264-277. Available at:


Technology of continuous professional training of future specialists in navigation and sea vessel management at higher maritime educational institutions

Tecnologia de formação profissional contínua de futuros especialistas em navegação e gestão de embarcações marítimas em instituições de ensino marítimo superior

Tecnología de formación profesional continua de futuros especialistas en navegación y gestión de buques marítimos en instituciones de educación marítima superior

Resumo
O artigo comprova a tecnologia de formação profissional contínua de futuros especialistas em navegação e gestão de embarcações marítimas em instituições de ensino marítimo superior e os resultados de testes experimentais de sua eficácia. Também foram determinadas condições pedagógicas que tenham impacto transversal e que sejam implementadas durante todas as quatro etapas. Para testar a eficácia da tecnologia do autor, foi realizado um estudo, que envolveu estudantes que estudaram nos níveis de bacharelado e segundo (mestrado) em instituições de ensino superior. A comparação dos resultados do estado de formação de prontidão de futuros especialistas em navegação e manejo de embarcações marítimas para atividade profissional em grupos de Controle e Experimental utilizando métodos estatísticos matemáticos mostrou que características qualitativas e quantitativas obtidas possuem diferenças confiáveis em favor de grupos experimentais, o que indica a eficácia da tecnologia do autor.

Keywords: Continuous professional training. Future boatmasters higher maritime educational institutions. Specialists in navigation and sea vessels management. Technology.


Abstract
The article substantiates the technology of continuous professional training of future specialists in navigation and management of sea vessels in higher maritime educational institutions and the results of experimental testing of its effectiveness. Pedagogical conditions that have a cross-cutting impact and should be implemented during all four stages have been also determined. To test the effectiveness of the author’s technology, a study was conducted, which involved students who studied at the first (Bachelor’s) and second (Master’s) levels of higher education in higher maritime educational institutions. Comparison of the results of the state of formation of readiness of future specialists in navigation and management of sea vessels for professional activity in Control and Experimental groups using mathematical statistics methods showed that obtained qualitative and quantitative characteristics have reliable differences in favor of experimental groups, which indicates the effectiveness of the author’s technology.

Keywords: Continuous professional training. Future boatmasters higher maritime educational institutions. Specialists in navigation and sea vessels management. Technology.