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**SOME ISSUES OF PRACTICAL TRAINING OF MECHANICAL STUDENTS****ДЕЯКІ ПИТАННЯ ПРАКТИЧНОЇ ПІДГОТОВКИ СТУДЕНТІВ-МЕХАНІКІВ****Kisietov J. V. / Кісєтов Ю.В.***c.t.s., as.prof. / к.т.н., доц.*

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**Abstract.** *The experience of implementing a modern approach to the professional and practical training of specialists at the level of higher education is analyzed. Examples of the use of the group work method in classroom practical classes of students specializing in "Management of ship technical systems and complexes" in specialty 271 "River and sea transport" for the first (bachelor) level of higher education are given.*

**Key words:** *educational process, intensification of training processes, training of ship mechanics, experience of organizing group work, technological stages of group work, an example of the implementation of a group task.*

**Introduction.**

One of the innovative tasks of modern education is to achieve a qualitatively new level of mobility and professional and practical training of specialists, taking into account the need for effective adaptation of a person to life in the conditions of the modern media and information space. Currently, the main component of professional training of a specialist is the ability to critically analyze, synthesize, reproduce and competently use new information. In recent years, the issue of increasing the innovative component of modern education has gained considerable interest among scientists and practitioners who are related to the educational processes of education [1- 5 and others]. An essential component of the innovative modernization of modern education is the need to implement the latest methods in parallel with the existing ones. It is also quite difficult to assess the effectiveness of the proposed modernization in such conditions.

**Basic text.**

In the conditions of growing volumes of information from many fields of science, engineering and technology, putting forward high professional requirements for future ship mechanics, there is a need for constant intensification of the processes and methods of their training.

Learning as a creative process became the process of solving non-standard scientific and educational tasks using non-standard methods, methods of problem-based learning, the essence of which was the formation of problem situations in the educational process, identification and solving of problems by students, the solution of which will allow obtaining the necessary training for successful work in the future.

The peculiarity of maritime education is that it is regulated by national and mandatory normative documents of the International Maritime Organization. In particular, the training of maritime transport specialists in Ukraine must meet the requirements of the International Convention on Training, Certification of Seafarers and Watchkeeping PDNV-78/95 (STCW) and the PDNV Code with Manila



Amendments 2010 p. [6; 7].

The professional features of the processes of training and subsequent activities of ship mechanics are also a sufficiently large volume of the practical component of the educational complex. (For example, in the curriculum for the preparation of bachelor's level specialists, such a form of educational process as practice takes up to 25% of the total time). In addition, certain features of the study of some issues require a collective (group) solution through group discussions, role-playing games, acting out situations, using simulators, etc [5].

Peculiarities of organizing group work:

- division of the academic group into working groups (2-4 students);
- each group receives a certain task and performs it together under the direct supervision of the group leader;
- tasks in the group are distributed in such a way as to make it possible to take into account and evaluate the individual contribution of everyone;
- the composition of the group is not constant (it is selected depending on the content and nature of the expected work, taking into account the fact that the educational opportunities of each member of the group can be effectively realized).

Technological stages of group work in class:

*The first stage is preparation for the group task:*

- statement of the problem (problem situation) and its goal;
- division of the task into separate components;
- formulating tasks for groups;

*The second stage is group work:*

- familiarization with the material, planning work in a group;
- distribution of tasks among group members;
- individual performance of tasks;
- discussion of individual results of work in the group;
- discussion of the general task of the group (remarks, additions, clarifications, generalizations);
- registration of group results of a common task;

*The third stage is the concluding part:*

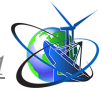
- notification of the results of the groups' work;
- summarizing the performance of group tasks;
- general analysis of the cognitive task;
- a conclusion about group work and achievement of the set goal (commenting by the teacher on the work of the group).



During group work, the teacher monitors the progress of work in groups, answers questions, regulates conflicting situations and work order, and provides assistance to individual students or groups in case of extreme need.

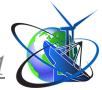
Below is a fragment of the implementation of a group task on the example of the task of assessing the condition of cylinders and pistons of a low-speed engine during operation. The task plan and solution were formed on the basis of the instructions of the engine builder MITSUI-MAN B&W ME(ME-B) ENGINES (Table 1) [7].




**Table 1. A sample of task performance results**

<b>TASK, PERFORMER</b>	<b>DECISION</b>
Task for group 1 - "Condition of the cylinder. General Information." Performer: student A1, A2	General to obtain and maintain a good cylinder condition involves the control of many factors. Since most of these factors can change during the service period - and can be influenced by service parameters within the control of the engine room staff - it is of great importance that running conditions and changes are followed as closely as possible. By means of continual monitoring, it is normally possible to discover abnormalities quickly and thereby, take countermeasures at an early stage. In particular, it is advisable to regularly check the cylinder condition by means of inspection through the scavenge ports from the scavenge air receiver and via the small covers on the manoeuvring side as well - especially concentrating on the piston ring condition.
Task for group 2 - "Condition of the cylinder. Function of piston rings" Performer - students B1, B2	The function of the piston ring is to give a gas-tight sealing of the clearance between the piston and cylinder liner. This seal is brought about by the gas pressure above and behind the piston ring, which forces it downwards, against the bottom of the ring groove, and outwards against the cylinder wall. In order to ensure optimum sealing, it is therefore important that the piston rings, the grooves, and the cylinder walls, are of proper shape, and that the rings can move freely in the grooves (since the piston will also make small horizontal movements during the stroke). The lubrication of the piston rings influences the sealing as well as the wear and deposits. Experience has shown that unsatisfactory piston ring function is one of the main factors contributing to poor cylinder condition. For this reason, regular scavenge port observations should be carried out as a means of judging the piston ring condition.
Task for group 3 - "The state of the cylinder. Inspection of the blow hole" Performer: students C1, C2	General Regarding intervals between scavenge port inspection, see the instruction book "MAINTENANCE", Chapter 900, "Checking and Maintenance Program". The scavenge port inspection provides useful information about the condition of cylinders, pistons, piston skirts, piston rods and piston rings. The inspection consists of visually examining the piston, piston skirts, piston rods, piston rings and the lower part of the cylinder liner directly through the scavenge air ports, and measurements of the ring clearance, the CL grooves and, if possible, the thickness of piston ring coating. To reduce the risk of scavenging box fire, remove any oil sludge and carbon deposits in the scavenge air box and receiver in connection with the inspection. With the relevant pumps running an evaluation can be made of the fuel valve sealing tightness, piston tightness for lub oil and the cylinder cover's sealing tightness for cooling water.



<p>Task for group 4 - "Purge air receiver inspection procedure" Performer: students D1, D2, D3</p>	<ol style="list-style-type: none"> <li>1) Scavenge port inspections are best carried out by two persons. The more experienced person inspects the surfaces and states the observations to an assistant, who records them and later enters them in engine builder standard forms.</li> <li>2) Keep the cooling water, fuel oil and cooling oil circulating, so that possible leakages can be detected.</li> <li>3) Block the starting air supply to the main starting valve. Open the indicator valves. Engage the turning gear.</li> <li>4) Remove the inspection covers on the manoeuvre side of the cylinder frame, and clean the openings. Open the access cover(s) to the scavenge air receiver and then enter the scavenge air receiver.</li> </ol>
<p>Task for group 5 - "Safety technique of the process of inspection of the purge air receiver" Performer: students E1, E2, E3</p>	<ol style="list-style-type: none"> <li>1) Do not enter the scavenge air receiver before it has been thoroughly ventilated.</li> <li>2) The access cover to the scavenge air receiver must be locked and secured in open position during inspection to prevent it from closing by accident.</li> <li>3) Take care when moving around in the receiver and bring proper lighting. Pockets for thermometers are placed in head level. Wear head protector (helmet etc.).</li> <li>4) Remember to take breaks to replenish fluid lost from sweating, especially in hot climates. Bring in bottles with drinking water for consumption in the scavenge air receiver.</li> <li>5) When turning is carried out, prepare to be able to stop it in any case. Always bring the turning gear switch into the scavenge air receiver during inspection.</li> </ol>
<p>Task for group 6 - "Assessment of the condition of the purge air receiver" Performer: students K1, K2, K3</p>	<p>Check and note the condition of the scavenge receiver:</p> <ol style="list-style-type: none"> <li>1) No Sludge. Note that water from defect water mist catcher could cause a very clean scavenge air receiver;</li> </ol>  <ol style="list-style-type: none"> <li>2) Normal picture. Indicates good cylinder condition;</li> </ol> 



	<p>3) Much Sludge. Remove any oil sludge and carbon deposits in scavenge receiver.</p> 
<p>Task for group 7 - "Checking for leaks in the purge air receiver" Performer: students M1, M2, M3</p>	<p>Check the piston crown top for any leakages (remember to keep cooling water, fuel oil and lubricating oil circulating during the inspection).</p> <p>1) If oil is found on the piston, determine if it is fuel oil or lube oil. Fuel oil will be black and sticky, indicating a fuel valve is leaking. Lube oil will be brown and non-sticky, indicating it could be from an exhaust valve.</p>  <p>2) Water on a piston indicates a cooling system leak. If water is found, it is important to determine what the cause is. Use either a mirror or photo, to establish if the leak is from the cylinder cover, exhaust valve or a cracked liner.</p> 

**Conclusion.**

Learning as a creative process requires the solution of scientific and educational tasks using the methods of problem-based learning, the essence of which consists in the formation of problem situations in the educational process, the identification and solving of problems by students, the solution of which will allow obtaining the necessary training for successful work in the future. The given information can be used as an aid in the development of educational and methodical documents (curriculums, manuals, methodological instructions, etc.) to ensure the process of training ship mechanics. Also, this approach makes it possible to develop similar information justifications for other specializations of the system of education of future sailors.



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**Анотація.** Сучасний освітній процес з використанням методів проблемного навчання дозволяє отримати необхідну підготовку для успішної праці спеціалістів в майбутньому. В роботі проаналізовано досвід впровадження сучасного підходу до професійно-практичної підготовки фахівців рівня вищої освіти шляхом організації групової роботи. Наведено приклади використання метода групової роботи на аудиторних практичних заняттях студентів спеціалізації «Управління судновими технічними системами і комплексами» за спеціальністю 271 «Річковий та морський транспорт» для першого (бакалаврського) рівня вищої освіти.

**Ключові слова:** освітній процес, інтенсифікація процесів навчання, методи проблемного навчання, підготовки суднових механіків, досвід організації групової роботи, технологічні етапи групової роботи, приклад реалізації групового завдання.