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DEVELOPMENT OF TECHNICAL THINKING IN THE PROCESS OF TEACHING ELECTRICAL ENGINEERING IN HIGHER MILITARY EDUCATIONAL INSTITUTIONS

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ABSTRACT

This article discusses the main tasks of the development of technical thinking in the process of teaching electrical engineering in higher military educational institutions.

Keywords: educational process, thinking, teaching method, cadet, electrical engineering, mathematical model.

One of the important trends in the development of education is the revision of the very concept of the organization of educational and cognitive activity, pedagogical management of it. From the concept of authoritarian management, where the cadet acts as an “object” of learning influences, they move to a system of organization, support and stimulation of their cognitive independence, creative and intellectual development. The goal of activating learning is aimed at this. The tasks of psychology in the Higher Educational Institution include, in particular, the formation of cognitive processes of cadets: perception, memory, skills, abilities, thinking, etc. For the intellectual factor in any kind of work, the need to solve complex technical and organizational tasks is rapidly increasing. In such conditions, the question of the need to improve the old and develop new teaching methods is becoming more and more acute. The task arises of implementing the principle of forming an active personality of the student, the development of his creative thinking, intellectual abilities.

Thinking is cognition that leads to the solution of problems or tasks facing a person. It is known that knowledge that does not find application is soon forgotten, and the achieved level of thinking is preserved, functioning, developing. It is thanks to developed thinking that knowledge becomes deep and solid, is applied creatively, becomes beliefs, and is updated and replenished. The quality of the acquired knowledge depends on the quality of the emerging mental action.



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Thinking involves a purposeful correlation of available knowledge and perceived information to solve a specific task. It requires a creative approach to the task with the use of existing knowledge, a comprehensive analysis of current information, comparison and comparison of information.

Technical thinking in electrical engineering is based on logical operations of analysis, synthesis, comparison, and generalization, establishment of cause-and-effect relationships in the study of methods of obtaining, transmitting and using electrical energy. It is important that they not only reproduce the acquired knowledge, but, if possible, encourage students to actively creative search. In this regard, the study of electrical engineering can be presented in connection with the need to solve the following problematic tasks:

1. Conducting lectures with the formulation of problematic issues put forward by life.
2. Solving experimental problems when performing a laboratory workshop.
3. Execution of calculation and graphic works.

The lecture should show the emergence of acute problems in the development of energy. The complexity of the current situation is that a completely different approach to the solution of energy production is already needed. If until recently it could be considered as a separate technical and economic task, then nowadays many factors have to be taken into account: there are reserves of traditional energy fuel, and the efficiency of the method of energy production, and the level of technical development of society for the development of promising energy sources, and the degree of impact of the chosen method of electricity production on humans and the environment The developing influence of each demonstration on the thinking of the trainees consists primarily in the fact that it reveals the logic of cause-and-effect relationships in the phenomena studied.

Electrical objects have many different properties and sides, and are often characterized by time-varying electrical parameters, which make their study and description extremely difficult. To make the latter possible, as previously noted, the method of idealization is used, i.e. replacing the real object with ideal ones. Models and substitution schemes significantly simplify the analysis of the phenomena occurring and at the same time allow us to obtain results that satisfy practice. Since substitution schemes correspond to the mathematical description of real electrical circuits with certain properties, they are sometimes called mathematical models of electrical circuits. The mathematical model is actually a theoretical explanation of



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the phenomena, processes occurring in the chain. Then the basis of the theory is an empirical basis, an idealized object, electrical quantities.

A mathematical model serves as a new theory that serves to explain a complex process with a set of facts that are inexplicable by the existing theoretical system and come into conflict with its basic provisions, and then it is these facts that form the empirical basis of the new theory.

When studying electrical engineering, one of the actual practical tasks is the assimilation of issues related to the electric drive. The question of choosing an electric motor for a production mechanism often arises. The performance of the mechanism, the course of the technological process depends on the characteristics of the electric motor. The task of choosing an electric motor is complex. It includes the following choices: type of current and rated voltage, speed of rotation, design.

Sometimes the task is facilitated by the fact that in specific production conditions, the type of current, voltage value, and rotation frequency are set. Then technical and economic indicators become the criterion of choice, where such requirements as efficiency and reliability of its operation are of decisive importance in the choice of an electric motor. Such logic of mental activity is the selection of power and the constructive type of the engine. It is important that the formed technical thinking, if possible, encourages the student to actively creative search. Performing laboratory work is not only an experimental verification of theoretical positions, but also instilling in students the skill of experimental research. Each work should be of a problematic nature: it should contain the purpose of the study, a hypothesis based on a theoretical assumption, the progress of the work, generalizations based on the measurement and calculation data obtained.

Comparison of the experimental data obtained with theoretical ones, search for reasons, in case of their discrepancy, evaluation of the experimental methodology and measurement accuracy require the student to search and creative thinking.

For the successful development of technical thinking, it is necessary to know its structure and the interaction of its components in the process of solving various technical problems. Technical thinking is based on technical knowledge, concepts and theoretical positions. Theoretical and practical actions in solving the problem are combined into a single group component, and there is close interaction and mutual transitions between them. Comparison of the experimental data obtained with theoretical ones, search for reasons, in case of their discrepancy, evaluation of the



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The developed electrical devices, if they have moving parts, should be created using their dynamic images. In this case, graphs and diagrams reflecting the process over time are used. They differ from working drawings and diagrams in that with the help of spate-temporal features, dynamic images can be created indirectly, reflecting connections and relationships – functional, load, physical, etc. The role of graphs in training is quite wide; with their help you can easily imagine a picture of changes in several processes when one of them is a function of others. The peculiarity of vector diagrams is that they allow you to visually operate with electrical quantities of current, voltage, power. The number of theoretical actions in solving constructive and technical problems can include the formation of new technical concepts and the operation of already known ones. Theoretical actions can proceed on the basis of practical actions also without direct reliance on an effective support, which can act in an imaginary or mental plane. An important feature of technical thinking is the solution of technical problems depending on the conditions in a multivariate form, in which case the same problem is solved in different ways.

Educational activity is always simultaneously aimed at understanding, comprehension, memorization of the material, and at solving theoretical and practical problems. The cadet as a subject of educational activity is primarily determined by its motivations – achievement motivation and cognitive motivation. Learning and thinking are inseparable. The development of thinking is one of the main characteristics of a person's learning ability.

The quality of the acquired knowledge depends on the quality of the emerging mental action. The quality of knowledge here refers to the completeness of the reflection of the conditions necessary for the correct performance of the action, the degree of generality of the reflection of these conditions. The development by cadets of the system of concepts and knowledge necessary to fulfill the tasks of future work is the main condition for the formation of their professional thinking. Any profession



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places high demands on the thinking of a specialist. It should be purposeful, mobile and accurate. The role of independent thinking has increased, which makes it possible to find the right solution under difficult conditions.

The formation of professional thinking is closely related to the educational activities of a cadet at the Higher School of Economics. Educational activity is always simultaneously aimed at understanding, comprehension, memorization of the material, and at solving theoretical and practical problems. Learning and thinking are inseparable. The development of thinking is one of the main characteristics of a person's learning ability.

Therefore, in order to form professional thinking, it is necessary to train cadets in solving various tasks that develop their mental abilities and skills of analysis, synthesis, abstraction, generalization, classification, assessment of the situation in the field of professional activity.

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