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SYSTEMS APPROACH IN MILITARY PERSONNEL TRAINING TECHNOLOGY

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Abstract

The article presents a theoretical and practical analysis of the theoretical foundations and technologies of practical application of the systems approach in the educational process of a military educational institution. The systems approach reduces most complex tasks to a project result that can be used to improve the quality of the decision in one or more major tasks. Prominent scholars and the founders of the systems approach as a method of scientific cognition included L. von Bertalanffy, A.A. Bogdanov, H. Simon, P. Drucker and A. Chandler who worked in the 1940-50s. The systems approach was also developed and studied by such classical scholars as B.F. Lomov, B.G. Anaev, P.K. Anokhin, T. Kuhn, A. Makarenko, E. Laszlo and others. To fully expound the concept of the systems approach, one must clarify the "nature of the system itself", what the "system" means and how systems are implemented at different levels of the world of observation. For this study of the systematic approach to the technology of developing military education in the context of rapid development and growth of equipment and weapons, in our opinion, P.K. Anokhin's definition of the "system" can be considered the most appropriate, "A system is a complex of inventive components, wherein interaction and interconnection take the form of interaction of components for obtaining a single focused result". This definition of a system fully corresponds to the analysis and synthesis of "artificial systems" in such a sphere of human activity as the specific educational process at a military educational institution.

Keywords

Training of military personnel – Systems approach – Educational process

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Introduction

The objective basis for the development of pedagogical ideas is philosophy. Philosophy determines the general approach and direction and indicates the method of cognition of pedagogical phenomena. One should note that the "pedagogical version" of the systems approach was developed from two sides: by researcher-educators within the framework of pedagogy and by philosophers within the framework of the general scientific systems approach. Philosophers defined the key features of the systems approach not within specific sciences but in the sciences of society, nature and thinking. Any systems approach is determined by five basic principles: integrity, hierarchy, structuring, plurality and systematicity. The last principle essentially combines all other principles since it states that each object can have all the features of the system.

The systems approach should be understood as the consolidation of most complex tasks to the result of the single project that can be used to improve the quality of the solution to one or several key tasks.

The systemic analysis identifies some essential subsystems for the efficient functioning of the pedagogical system. It is obvious that within any pedagogical system, the subsystem "teacher-student" is prioritized, then come "student-content", "student-means", "teacher-content", "teacher-means" and "student-student". For example, if we take a closer look at the teacher-student subsystem, the following factors are manifested here the most clearly: a) the degree of connection between the student and the teacher (from complete freedom of choice to strict determination); b) the interaction of biological conditions with social influences and properties; c) the teacher's communication style (authoritarian, collegiate, liberal-democratic). The interaction of all subsystems is dialectically complex. The systemic analysis enables researcher to study the possible types of subsystem interaction and identify the most favorable conditions for the functioning of the entire system.

The comprehensive approach in pedagogy is viewed as the development of a systemic phenomenon within the educational process. One is supposed to pay special attention to the pedagogical process as an integrated system with a certain structure where each element performs its function for solving problems, and the movement of the element follows the patterns of the entire movement. This approach indicates the continuity of training and education, that is, learning and personal development are inseparable.

Literature review

Prominent scholars and the founders of the systems approach as a method of scientific cognition included L. von Bertalanffy, A.A. Bogdanov, H. Simon, P. Drucker and A. Chandler who worked in the 1940-50s. A new line of research that determines and explains the essence of the proposed theoretical approach as a direction of scientific cognition was determined based on the Systems Theory by the Austrian biologist L. von Bertalanffy^{1,2}.

¹ L. von Bertalanffy, *Robots, Men and Minds* (New York: George Braziller, 1968) y L. von Bertalanffy, *General Systems Theory. Sistemnye issledovaniya*. Ezhegodnik (Moscow: Nauka, 1969).

In the book "The Structure of Scientific Revolutions"³, T.S. Kuhn sees the distinguishing features of scientific revolutions in the manifestation of new conceptual frameworks and paradigms. Such paradigms highlight the aspects of science that have not been previously noticed or implemented or have even suppressed by "normal" science, that is, the science that is currently generally accepted and practiced. Therefore, during the period of scientific revolutions, there are shifts in the problems studied and changes in the rules of scientific activity that can be compared with changes in the perceived gestalt in well-known psychological experiments when, for example, "instead of a rabbit, two profiles of a cup or duck can be seen". It is clear that in such critical periods philosophical analysis becomes particularly significant, the need for the analysis is not recognized during the development of "normal" science⁴.

The systems approach was developed and studied by such classical scholars as B.F. Lomov, B.G. Anaev and P.K. Anokhin. According to B.F. Lomov's concept, the key human quality is the social system.

V.G. Afanasev claims that only the systems approach allows one to integrate heterogeneous specific problems, bring them to a common denominator and, in this way, present a complex group of various problems as one problem⁵.

E. Laszlo considers the systems approach in terms of systems philosophy, that is, the reorientation of thinking and worldview of the concept of "system", as a new scientific paradigm (as opposed to the analytical, mechanistic, linear-causal paradigm of classical science). The philosophical theory of the systems approach is a scientific theory of a "system" as a whole. The theory broadens its scope as a general theory of systems and has its own "meta-scientific" and philosophical aspects⁶.

The notion of "system" as a new "paradigm" or a new "natural philosophy" is addressed in the works by Thomas Kuhn⁷.

To fully expound the concept of the systems approach, one must clarify the "nature of the system itself", what the "system" means and how systems are implemented at different levels of the world of observation. This is systemic ontology. Scientists define and describe the system as an obvious question with a trivial answer. One can agree that the galaxy, dog, cell and atom are "systems". However, in what sense and in what respect can one talk about an animal or human society, personality, language, mathematics, etc. as about "systems"? First, one must distinguish between real systems, that is, objects perceived in observation or separated from observation that exist independently from the observer.

At the same time, there are conceptual systems such as logic or mathematics that are essentially symbolic constructs (but they also include the structure of the system) and abstract systems (sciences)⁸.

² L. von Bertalanffy, General Systems Theory. Sistemnye issledovaniya. Ezhegodnik (Moscow: Nauka, 1969).

³ T. S. Kuhn, The Structure of Scientific Revolutions (Chicago: University of Chicago Press, 1962).

⁴ T. S. Kuhn, The Structure of Scientific...

⁵ V. G. Afanasev, Sistemnost i obshchestvo (Moscow: Politizdat, 1980).

⁶ E. Laszlo, Introduction to Systems Philosophy (New York: Gordon and Breach, 1971).

⁷ L. von Bertalanffy, Robots, Men and Minds...

⁸ J. G. Miller, Living Systems: Basic Concepts (Boston: Little, Brown, 1968).

Scientists point to the systems approach, that is, conceptual systems that correspond to reality, without a vast difference in features, as a subclass in which the difference is not as substantial as in other systems⁹.

B.F. Lomov's concept of the systems approach¹⁰ states that the system possesses all the person's connections and relationships with other people and their communities that ensure the necessary conditions for the system's existence and development. At the same time, a person is an integral part of the social system. The fact that a person is a part of this system is determined by the person's social qualities that express their essence and exist as an integrated system. Therefore, to objectively expound these qualities, it is necessary to analyze the relationship between the individual and society¹¹.

According to P. Anokhin's observations, the use of the systems approach should be very productive. The modern scientist's goal is to fill the gap between the level of the whole and the level of the individual in many sciences. "Naturally", says P. Anokhin, "it is impossible to fill this gap with words and definitions: there must be efficient principles of work in this direction"¹².

Methods

A system is understood as a comprehensive set of interconnected elements in the combination of interacting objects, entities and relationships¹³.

For this study of the systematic approach to the technology of developing military education in the context of rapid development and growth of equipment and weapons, in our opinion, P.K. Anokhin's definition of the "system" can be considered the most appropriate, "A system is a complex of inventive components, wherein interaction and interconnection take the form of interaction of components for obtaining a single focused result"¹⁴.

This definition of a system fully corresponds to the analysis and synthesis of "artificial systems" in such a sphere of human activity as the specific educational process at a military educational institution.

Results and discussion

The systems approach is not a set of guiding principles or principles for a leader; it is a way of thinking about organization and management based on considering problems as a whole, as a system¹⁵.

⁹ L. von Bertalanffy, "The History and Status of General Systems Theory", The Academy of Management Journal, Vol: 15 num 4 (1972): 407-426.

¹⁰ B. F. Lomov, Metodologicheskie i teoreticheskie problemy psikhologii: monografiya (Moscow: Direkt-Media, 2008).

¹¹ B. F. Lomov. Metodologicheskie i teoreticheskie...

¹² P. K. Anokhin, Izbrannyye trudy: Filosofskie aspekty teorii funktsionalnoi sistemy (Moscow: Nauka, 1978).

¹³ L. von Bertalanffy, "The History and Status..."

¹⁴ P. K. Anokhin, Obshchie printsipy teorii funktsionalnoi sistemy (Moscow: Nauka, 1980).

¹⁵ I. T. Frolov, Obshchaya teoriya system. Dictionary of philosophy (Moscow: Politizdat, 1981).

The systems approach is an aspect of the methodology of social and scientific knowledge and social practice that is based on the study of objects as systems¹⁶.

The implementation of the systems approach in the educational process at a military educational institution involves the following sequence of actions:

- the revision of individual elements of the pedagogical process separately from the others;
- establishing and classifying the relationships of the set – external (relationships with the rest of the world) and internal (relationships between elements);
- the determination of the principles of systemic interaction with the pedagogical environment based on the analysis of the complex of external connections;
- the differentiation of a special type of relationship that establishes a system between many internal relationships that provide a certain degree of order within the pedagogical system;
- the clarification of the order, structure and organization of the pedagogical system in the learning process (the structure expresses the invariant aspect of the system, and the organization expresses quantitative characteristics and direction of regulation);
- the analysis of the basic principles of behavior of the pedagogical system that are determined by the system as a single organized complex of military training;
- the study of management processes that ensure sustainable behavior and the achievement of efficient results in the system of military education.

The crucial principles of the systems approach in military education are as follows:

- 1) the decision-making process should begin with setting goals and objectives;
- 2) it is necessary to consider the problem as a whole as a single system and identify all the consequences and interrelationships of each particular solution;
- 3) it is necessary to identify and analyze possible alternative ways to achieve the goals and objectives;
- 4) the goals and objectives of individual subsystems should not contradict the goals of the entire system;
- 5) the transition from the abstract to the specific;
- 6) the unity of analysis and synthesis, logical and historical;
- 7) the detection of various qualitative relations in the object during their interaction.

¹⁶ I. V. Blauberg; V. N. Sadovskii y E. G. Yudin, Sistemnye issledovaniya i obshchaya teoriya system. In the book: Sistemnye issledovaniya. Metodologicheskie problemy (Moscow: Nauka, 1969).

The key systemic principles of military education are:

- 1) integrity;
- 2) structure;
- 3) the interdependence of structure and environment;
- 4) hierarchy;
- 5) definition;
- 6) dynamism;
- 7) inertia;
- 8) the presence of a control parameter;
- 9) the presence of direct communication and feedback;
- 10) the multiplicity of the description of each system.

For the present study, one can cite Anton Makarenko by saying that it is impossible to form a personality fragmentarily. Therefore, the comprehensiveness of the approach is necessary as its main idea is expressed in the fact that the properties of the whole are not the product of the properties of its elements¹⁷.

The elements of the educational system in a military higher educational institution are teaching media that are part of the system and perform certain functions. In the education system, each element is a subsystem, but in the internal structure, this element will be a system. Subelements will act like systemic elements (second-order).

The means (aspects) of education are systemic elements in military training:

- theoretical training;
- psychological and pedagogical training;
- psychophysical training;
- practical combat training.

Each element is a system.

The elements are part of a system based on the degree of freedom at which they may be required for the production of a system result. The elements included in the system are ordered according to the specified parameters. The main tool for ordering the interaction of system elements is the results that stabilize the organization of the system.

¹⁷ A. S. Makarenko, *Sobranie sochinenii v pyati tomakh* (Moscow: Pravda, 1971).

To achieve the programmed systemic result – reformatting military education in the context of the rapid development and growth of equipment and weapons, it is necessary to organize the system based on certain patterns (principles) that should influence various teaching media to ultimately form a certain highly organized, flexible set of many possible integrative formations in response to environmental influences.

The inclusion of training elements in the system and their ordering should provide a coherent and interconnected adaptation system so that the body can create adaptation systems in response to the informational impact of each tool of the educational process, not destroying but improving and supplementing the formed adaptation complex with the informational impact of other means (elements) of the system. Therefore, the revision of the elements (means) in the training system in a military educational institution should be carried out using certain interactive training tools that are directly introduced in the educational process. Moreover, the result of the system can be obtained not by a simple sum of the results of the impact of various means (elements) of the educational process but only under the influence of the training means. In other words, the professional reliability of a member of the armed forces cannot be formed by any single means of training, for example, only psychophysical, but only by the sum of all professional training in the process of military education during the preparation of future officers. To achieve the programmed result, it is necessary to arrange the elements (training means) of the system so that their interaction becomes "interaction" to get a "focused" result. An important feature of the system is the inability of the element to exist outside the system and the destruction of the system when the element drops out. The technology of systemic training in a military educational institution can be a system only if its element cannot perform the functions of the entire system and, at the same time, cannot perform its functions outside the organization of the system.

The inclusion in the system of a special tool (subsystem) for training future officers does not mean that the connection of this element with the environment will be disrupted. On the contrary, the organization of the training system in a military educational institution should ensure not only the functional aspect but also the structure that must encompass the interconnections of these subsystems. The system functions only when its elements and subsystems are united. Elements form a system only if the elimination or failure of any of them changes the program of all system activities. An important factor in the clarification of the essence of training at military educational institutions is the interaction of other systems for the formation of future officers of the Armed Forces that ensure their professional development. This need is caused by the current uncertainty in the structure of systems and their interaction to obtain a common result. It should be noted that such questions are rather difficult to answer in the style of analytical thinking¹⁸.

Conclusion

The results of studies carried out to improve the training of future officers but without taking into account the entire structure, in this case, cannot be integrated into the system to have a coordinated and integrative nature. As a result of interaction with other training tools, some efficient tools may change or acquire new qualities that are not taken into account in the study of the system organization. This affects the focused learning result in a military educational institution.

¹⁸ P. K. Anokhin, *Izbrannye Trudy...* y P. K. Anokhin, *Obshchie printsipy teorii...*

The essence of the systems approach in military education is that any detail of research and observation can be based on a mechanism of internal architectonics. Any scientific topic that aspires to be true cannot be formulated outside a specific system. Moreover, the interpretation of the research findings is undoubtedly most efficient when systemic mechanisms are taken into account.

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