МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ КОРАБЛЕБУДУВАННЯ
ІМЕНІ АДМІРАЛА МАКАРОВА

# ІННОВАЦІЇ В СУДНОБУДУВАННІ ТА ОКЕАНОТЕХНІЦІ

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МИКОЛАЇВСЬКА ОБЛАСНА ДЕРЖАВНА АДМІНІСТРАЦІЯ
ДЕПАРТАМЕНТ ОСВІТИ І НАУКИ МИКОЛАЇВСЬКОЇ ОБЛАСНОЇ ДЕРЖАВНОЇ АДМІНІСТРАЦІЇ

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**Відповідальний за випуск**

Павлов Геннадій Вікторович

*Редакційна колегія не несе відповідальність за достовірність наведених даних та посилань. Матеріали публікуються в авторській редакції*

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# CHOICE OF SOLUTION SEARCH METHOD UNDER UNCERTAINTY

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The abstracts reveal the meaning of the concept of uncertainty, consider heuristic research methods, among them are the most common methods of choosing ways to solve problems and task

**Key words:** uncertainty, problem, task, search methods.

The concept of "uncertainty" can be considered today one of the popular concepts used not only in philosophical research, but also in works in the humanities, social sciences, natural sciences, which consider this concept in different historical contexts and situations. Uncertainty is due to the lack of reliability and the amount of information on the basis of which you need to make your choice.

Here is the classification of uncertainty by type and the reasons for its occurrence [2]:

The fundamental uncertainty is due to the impossibility of obtaining information in principle, for example, at this level of development of scientific knowledge.

Uncertainty caused by the total number of objects or elements of the system, for example, when their number exceeds; caused by lack of information or its improbability due to technical, social or other reasons; generated by a price that is too high or unaffordable to establish certainty created by the decision maker due to his incompetence; lack of experience and knowledge of the factors influencing the process; as a consequence of limitations in the decision-making system (time and space constraints on the parameters that characterize decision-making factors) caused by non-antagonistic behavior of the opponent, which has an impact on the decision-making process.

Another classification of types of uncertainty involves: uncertainty, incompleteness, inadequacy, inadequacy, uncertainty. [2]

The choice of method for finding ways to solve problems and problems is still in its infancy. The creation of such a technique is complicated by a number of objective reasons [1]: - the problem usually, can be solved by using several, and in some cases a large number of principles; - each principle of solving problems can mostly be found by several approximate methods; - on the other hand, often different search methods lead to the same principle of decision; - along with the objectively existing laws of the creative process, it is necessary to take into account the individual characteristics of each person; - there are stereotypical methods for finding solutions to most inventive problems that lead to solutions in most cases. A solution found through the use of a stereotypical method is often less original than that achieved through the use of a method that has not previously been used to solve similar problems; - any choice of methods for finding solutions to inventive problems is associated with limiting their number. The choice of a number of stereotypical methods often means the elimination of the optimal method to achieve a solution with the most vivid originality.

However, the creation of a methodology for selecting tools for solving inventive tasks is quite possible, although this does not guarantee the optimal selection of these funds in each case. A number of such selection methods have long been used in inventive practice. The inventors choose the means of solving problems in different ways: some use their development of methods of choosing means, others consciously activate past experience in solving similar problems, others make the choice more or less intuitively.

The method of choosing solutions is based on the conscious use of mental operations for the optimal choice of methods and modes of action.

Prerequisites for the correct choice of tools are the judgment of the problem situation, semantic interpretation of the problem, for example, in the form of a sketch, graph, block diagram of the components of the problem, updating past experience and knowledge in solving inventive problems.

Consider the most common methods of choosing ways to solve problems [1]:

The method of linear arrangement of means of solution is a simple method of this kind. The essence of it is to compile a list of known to the inventor simple heuristic means of solving inventive tasks, from which to solve a particular problem are selected individual tools. The most common lists of heuristic methods for solving the problem, which are based on different principles. Some inventors group them alphabetically, others by frequency of application in a particular field of technology, a third by the degree of universality of application, a fourth by conditional originality or triviality of the expected result, and some compile several lists by selected method classification criteria (eg list of method sets), list of complex methods, list of simple universal methods, list of special methods).

Some inventors use one universal list of linear arrangement of methods for all cases, others to solve a specific problem make a special list of methods selected by a preliminary assessment of their applicability in specific conditions. It should be noted, however, that a preliminary assessment of problem-solving methods in terms of their effectiveness and applicability may lead to the exclusion of the most effective of them. In technical creativity, not everything comes down to rational thinking. In addition, the best methods for solving trivial technical problems are rarely the best for solving creative problems, at least similar. Therefore, a well-justified tool used by some experienced inventors in choosing the means of solving the problem: they try to solve the inventive problem not the most typical for it, but the least reliable method, the expected effectiveness of which is the lowest in solving similar problems. There is a methodical rule: traditional standard methods of solving inventive problems are more effective, non-traditional ones give more original solutions.

The method of linear arrangement of methods for solving inventive problems is widely used in the United States. One of the American lists of methods is as follows: the method of the list of control questions A.F. Osborne; method of information of characteristic features (method of "dismemberment") R.P. Crawford; method of cost and results analysis Yu. K. Fang; association chain method; method of clarifying the opinion of others (method of complex reason) G.V. Gabriel; method of brainstorming (method of using unexpected thoughts) A.F. Osborne; synectics of W. J. Gordon.

American experts also recommend methods of inversion, empathy, consideration of the technical object from the inside, analogies. The method of linear arrangement of solutions due to the simplicity of its application is recommended for novice inventors.

The method of tabular (matrix) arrangement of means of solving inventive tasks involves some conditionality, determinism of application of methods from any criterion. It is based on the assumption that inventive tasks are usually solved by typical methods. One of the simplest types of tables is recommended by the honored Soviet inventor A.N. Trusov. The table of selection of the most effective methods of solving inventive tasks is created by him empirically on the basis of creative experience in solving inventive tasks and is used in seminars on the methods of invention. The tabular arrangement of means of the decision of inventive problems offered by the engineer G.S. Altshuller is widely popularized. The proposed table, according to its author, reflects the typical technical differences between the conditions of the problem and known ways to solve them. Vertically, the table contains the elements of the technical object, which under the conditions of the task must be improved - increase or decrease (weight, length, area, volume, temperature, stability, lighting, ease of repair, etc.). Horizontally, there are parameters that are unacceptably deteriorating if the decision is made in a trivial way. At the intersection of the corresponding horizontal and vertical rows of the table lead the principles of solving the problem.

The tabular arrangement of methods for solving inventive problems of the above universal type can be more or less successfully used mainly to solve trivial technical problems, for example, problems

of conventional design according to generally accepted principles. Attempts to expand the tables in practice lead to their cumbersomeness, many alternative samples, inconvenience of use. Special tables can be successfully used for application in a certain field of technology or for solving certain stereotypical problems. There are known attempts to use to select methods of solving the table, in which the edges are lists of inputs and outputs, eliminating the disadvantages and desirable advantages, the specified technical purpose, unknown components of the tasks, their characteristics and so on.

Methods of hierarchical arrangement of methods for solving inventive problems are based on the concept that various private methods for solving inventive problems are based on several basic operations of thinking. The choice of a specific method of solving inventive tasks is carried out in several stages. The first is chosen one of the main operations of thinking or the main groups of methods for solving inventive tasks (eg, analogy, association, dismemberment, etc.). Then from a list of methods, such as analogy, the most appropriate for specific conditions method of solving the problem is selected. This hierarchical arrangement of methods on the principle of the tree was quite effective in the practice of invention and can have universal significance.

Another means of hierarchical arrangement of the solution of inventive problems is the star system method. A specific method of finding solutions to inventive problems is also selected in several stages.First, the guiding principle of the decision is chosen, determined by the analysis of the purpose and development trends of the industry and a specific technical object (analogue or prototype). Such guidelines can be, for example, the principles of universality, specialization, intensification, continuity, standardization, reliability. The guiding principle can be implemented by various heuristic stereotypical methods. For example, the principle of specialization can be implemented by methods of heuristic particulation, selection, elimination, simplification, reduction, autonomy, fragmentation of social needs into sub-needs, analogies with wildlife, bifurcation (division of the process or production flow into two parts). The principle of standardization is usually carried out by methods of aggregation, multiplication of standard elements, permutation of standard elements, transposition of standard elements, modular elements, micromodules, etc.

After choosing the principle and the most appropriate for specific conditions of the method of its implementation, it is sometimes necessary to choose a specific type or means of the found method. The method of aggregation, for example, is carried out by several means: increasing the number of working bodies, working positions or the number of parts processed in one position; as well as the creation of current aggregate lines with branched flows, linear and rotary layout. The method of stellar system can create both universal and specialized systems for the selection of means of solving inventive tasks. A distinctive feature and advantage of this method of selection is the purposeful consideration of trends and principles of technology development.

Of interest are the methods of combined placement of means of solving inventive problems in groups, which can be built on a list, tables, stellar system, on the principle of a tree and so on.

The group of traditional rational methods of invention includes methods based on heuristic analogy, inversion, integration, dismemberment and reduction, transposition, transformation, combination.

The group of stochastic methods for solving inventive problems includes methods of brainstorming, focal objects of C.S. Whiting, the method of Serendipus (use of side search results), methods of chains of free or forced associations, empathy (representation of oneself as a technical object), psycho-heuristic activation of intellectual activity (method of V.V. Chavchanidze), method of synectics of V. Gordon, etc.

The group of creative methods of standardization includes methods of aggregation, permutation of standard elements, transposition of standard elements, duplication and multiplication of standard elements, modular elements and micromodules, partitioning and spatial fusion, etc. A separate group consists of complex methods, sets of methods for solving inventive tasks and methods, such as algorithmic methods of system heuristics of I. Mueller, methods of information of characteristic features

of R. Crawford, methods of morphological approach of F. Zwick, methods of cost and results analysis of Yu. Fang, methods of creative engineering design G.R. Bull and others.

Group lists, tables, stellar systems of location of means of the decision of inventive problems include not only methods of search of the decision. In the same way, separate groups of heuristic principles, methodical rules, recommendations, means can be composed.

Heuristic methods are widely used today in various areas of human activity, as they stimulate the development of intuitive thinking, imagination, creativity and more.

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# DEVELOPMENT OF COMMUNICATIVE COMPETENCIES IN APPLICANTS OF TECHNICAL INSTITUTIONS OF HIGHER EDUCATION

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The importance of human communicative competence for modern society can hardly be overestimated. The formation of communicative knowledge, skills and abilities of the future specialist is in the field of view of both foreign and local researchers. Despite the large number of publications on the development of communication skills, as well as the appearance of several textbooks, many questions on this issue have not yet received an appropriate justification and unambiguous solution. Analysis of recent research and publications shows the need to address various issues related to the low level of communicative competence of future professionals in various fields.

The relevance of the research is exacerbated by the existing contradictions related to the non-compliance of the society with the requirements of a competent person in communication and the low level of communicative training of the candidates in the free economic zone.

The aim of the article is to characterize the problems of the communicative training of the candidates and to identify ways to increase the low communicative competence of the future specialists.

Problems of formation of communicative culture of specialists of different profile were considered by L.Aukhadieieva, L.Ivanchenko, I.Zaretska, S.Znamenska, V.Liventsova, I.Mazaieva, V.Sadovska, S.Sarnovska, V.Smorchkova, V Sokolova, H.Tymchenko, O.Shevtsova, M.Shovkun, N.Yurchenko and others.

Many production problems may not be at a low level of professional knowledge and content, but not at the level of the communicative competence of an individual due to the fact that they often require communicative conflicts at the interpersonal, group and social levels.

S. Omelchuk understands communicative competence as general knowledge in the field of communication, communication and navigation, necessary for the perception of strangers, and stimulates his own programs to improve actions, adequate prices, scale and situational communication [3, p.3-4]. The model of communicative competence considered by S. Omelchuk may look like this: