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## THE CONCEPT OF TECHNICAL THINKING IN PEDAGOGY AND PSYCHOLOGY

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**Abstract:** The article deals with the nature, peculiarities, types and forms of thinking in *pedagogy and psychology*. *Recommendations on the use of necessary mechanisms, forms and methods of organizing practical classes in the process of forming technical thinking in students are given.*

**Key words:** *thinking, technical thinking, goal, learning, skill, activity, field, reproductive thinking, technological process.*

### **Introduction**

The development of human civilization is currently carried out technologically, that is, through the creation and improvement of various technical devices and technological processes. At the heart of this activity lies human thinking. The formation of active, comprehensively developed members of our society requires a complex and multifaceted process. Indispensable components of this process are not only moral, cultural, labor education, but also technical development.

The most detailed theory of thinking in Russian psychology is found in the works of S. L. Rubinstein. He repeatedly emphasizes that thinking is the activity of the subject interacting with the objective world. He writes: "The process of thinking is primarily the analysis and synthesis of what is distinguished by analysis; This is the abstraction of the essence of the main working laws of thinking".

There is the following classification of thinking: productive (simple) and reproductive (creative) thinking.

A distinctive feature of effective thinking compared to reproductive thinking is the ability to independently discover new knowledge. But this knowledge is subjectively new and appears in the process of solving educational problems, the result of which is the assimilation of new knowledge previously unknown to this person, although this discovery is already present in social experience. According to the general psychological theory of thinking, S. L. Rubinstein divides thinking into intuitive thinking and analytical (logical) thinking.

### **Materials and methods**

Let's look at the classifications of technical thinking. Even Aristotle raised the question of the existence of two types of thinking: theoretical and practical, aimed at knowing the universal, requiring the application of universal laws to specific situations. Currently, there are various classifications of thinking. Let's look at the main classifications. Theoretical

and practical thinking are distinguished in psychology. Theoretical thinking is aimed at increasing the laws and properties of objects. Practical thinking is a thinking process that occurs during practical activity.

The difference between theoretical and practical types of thinking is that, according to B.M. Teplov, "they are related to different practices. Practical thinking work is mainly aimed at solving specific concrete problems. Thinking is mainly aimed at finding general patterns.

B. M. Teplov distinguishes the following types of thinking in his works: visual-figurative and visual-effective.

Visual-figurative thinking is a type of thinking, a conceptual form, based on the transformation of perceptual images into visual images, subsequent modification, change and generalization of the subject content of images that reflect reality in a figurative form.

The peculiarity of this type of thinking is that the thinking process in it is directly related to the perception of the surrounding reality by the thinking person and cannot be carried out without it. Visual-figurative thinking, a person can mentally manipulate images in such a way that he can directly see the solution to the problem. When solving structural and technical issues, it is not enough to imagine an object in its third dimension, to transfer this object to a drawing or drawing. This is one of the prerequisites for solving the problem. The main requirements are for the development of dynamic spatial images: the ability to see the movement of the interacting parts of the technical device, the ability to see the spatial connections and relationships between the moving parts of the device.

These images can work effectively only with sufficient formation of visual-figurative thinking.

Visual-effective thinking is one of the types of thinking, from which direct interaction with real objects, determination of their important properties and relationships begins. It creates a primary and initial basis for generalized reflection of reality. Its uniqueness is that the thinking process itself is a practical transformational activity carried out by a person with real objects. In this case, the main conditions for solving the problem are correct actions with the relevant objects. This type of thinking is widespread among people engaged in real production and technical work, the result of which is the creation of some technical object.

Participation in the modern technological process requires a special type of thinking - technical. Developed technical thinking allows to quickly understand the principle of operation of previously unknown machines and mechanisms. The term "Technical thinking" was introduced into philosophy by P.K. Engelmeier in the work "Technical philosophy". He emphasized that "there is a specific way of thinking that can be called technical". In the "Psychological dictionaries" of N.Z. Bogozov, I.G. Gozman, G.V. Sakharov, technical thinking is defined as an activity aimed at independently forming and solving technical problems.

In the Russian pedagogical encyclopedia, technical thinking is described as a process of human cognitive activity, characterized by a generalized and indirect reflection of the objects and phenomena of reality in their important properties, connections and relationships.

In the works of P.I. Ivanov, the concept of "Technical thinking" is separated from the concept of practical intelligence. He stated that practical intelligence is aimed at changing reality in order to create material objects. Therefore, in his view, practical thinking is manifested in practical actions and ideas.

According to P.I. Ivanov, "Man's intellectual work is carried out with the help of equipment and technology, and this technology also participates in the creation of new objects. Practical thinking is called "technical" and "constructive-technical thinking" in a narrow sense". In the work of V.V. Chebisheva, the problem of "Technical thinking" is not considered separate, that is, independent. According to the author, "Technical thinking of workers engaged in technology is questionable"

This is not the only way of thinking they have. The practical thinking of each worker is distinguished primarily by the various tasks that arise during the work process.

Thus, V.V. Chebisheva examines technical thinking in connection with the specific features of solving practical issues that arise during work. He pays great attention to the specific features of practical (production) tasks that cannot be performed without a system of special knowledge and skills. Among them are creative technical (constructive-technical, technology design and rationalization tasks) and non-creative tasks (planning and organizing labor activities, control and regulation of work processes, etc.).

### **Result and discussion**

There are other approaches to studying the process of performing technical tasks. For example: G. Kaiser did not connect this process with the problem of practical thinking. According to him, technical thinking does not require specific mental operations. He said, "The unique aspect of technical thinking is that it is included in practical production activities and is carried out on the basis of the actual conditions of this activity." Taking into account the actual conditions of technology and production, he considered that the performance of technical tasks in the labor process is not a decisive factor. Depending on the content of professional activity, G. Kaiser divides technical thinking into 3 forms: "constructive", "functional" and "economic". According to him, constructive, functional and economic thinking are related to each other. The division of the concept of "technical thinking" into types is intended to analyze the specific features of thinking. Development of constructive thinking "Why?" functional thinking requires the ability to answer the question "How?" requires an answer to the question. Economic (economical) thinking is aimed at taking into account the structural features of the equipment and the uniqueness of the technological process, taking into account its economy. This is expressed in the ability to find the most convenient (economical) ways to perform a certain work.

Analyzing the opinions of psychologists and teachers about technical thinking, we came to the conclusion that it is appropriate to talk about technical thinking as an

independent form of intellectual activity. Technical thinking, like any other thinking, is carried out with the help of well-known mental operations: comparison, contrast, analysis, classification, etc. It is only characteristic that the above operations of thinking in technical activity develop in technical material.

The process of formation of technical thinking among students, using the necessary mechanisms, forms and methods of organizing practical training, from the purposeful interaction of the teacher (master of vocational training) and students, is specially organized. is to create together in the conditions.

### **Conclusion**

The methodology for developing technical thinking should be based on the following principles:

- activity - occurs in the course of any development and any activity;
- individuality - it should be taken into account that the individual characteristics of each student allow him to teach his abilities only within certain limits;
- sequences - starting from the simplest ones, it is necessary to offer exercises that gradually complicate them as they are mastered;
- step-by-step - the development of abilities in educational activities includes such exercises, starting with the next step, it is impossible to skip the previous one;
- cyclicity - development exercises should be included in certain cycles, it is advisable to repeat these cycles several times during the academic year;
- psychological comfort - the student should not feel his failures;
- Student's cooperation with psychological services and parents.

To develop technical thinking, the following conditions must be met:

- avoid traditional, routine, monotonous teaching style;
- to prevent overloading of extra work and training;
- use of stimulation of cognitive interests;
- stimulation of cognitive interests using various techniques (illustrations, games, crosswords, funny tasks, entertaining exercises);
- special teaching of mental activity and educational work methods, use of problem-search methods of teaching.

Thus, it is necessary to form a positive motivation for learning, which involves the manifestation of voluntary efforts in the process of acquiring knowledge.

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