FORMATION OF COGNITIVE ACTIVITY OF STUDENTS IN THE PROCESS OF STUDYING CHEMISTRY

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Abstract. *The socio-economic transformations in society have reshaped the educational landscape, positioning students as active agents in the learning process. This shift calls for the enhancement of cognitive activity in the educational framework, particularly in subjects like chemistry. This article explores the formation of cognitive activity among students in the context of chemistry education, with an emphasis on developing methods that encourage the transition from empirical to abstract-theoretical levels of understanding. The study aims to organize a comprehensive cognitive activity system that integrates the assimilation of chemical knowledge, cognitive teaching methods, and the development of chemical thinking. The study aims to organize and develop a comprehensive cognitive activity system in students during chemistry lessons, focusing on assimilating subject content, mastering cognitive teaching methods, and developing chemical thinking. The research adopts a systematic approach to managing cognitive activity in chemistry education. It applies a methodology that integrates empirical and theoretical levels of knowledge, facilitating a transition from reproductive to heuristic and research-based learning. The study also focuses on creating tools and methods that help students acquire a comprehensive understanding of chemistry content and develop their thinking processes. The research emphasizes the importance of cognitive operations such as analysis, synthesis, and generalization, fostering students' abilities to solve complex tasks through reproductive, heuristic, and research-based learning approaches. A theoretical model of full-fledged cognitive activity is proposed, incorporating systematic, structural, psychological, and pedagogical principles to optimize learning outcomes. The results demonstrate that effective organization of cognitive activity enhances students' mastery of chemistry, improves reasoning skills, and fosters a style of chemical thinking, ultimately contributing to higher learning achievement.*

Keywords: *cognitive activity, methodology of organization, motivational and need development of students, formation of learning motives, development of a style of chemical thinking, empirical level of cognition, abstract and theoretical, comparative analysis.*

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Introduction. The socio-economic transformations of our society have set new challenges for national education. Modern education is based on a new socio-cultural paradigm, when the focus is on the student as an active subject of cognition in the educational space, when the priority of personal development is proclaimed. A characteristic feature of the individual in these conditions should be the desire to seek and satisfy their cognitive needs, a motivated attitude of the student to their own education, its level and quality. Improvement of the learning process is impossible without the organization of -full cognitive activity, that is, motivated activity of the student, carried out by him individually or together with the teacher and peers, aimed at mastering the content of the subject, mastering general and specific for the subject studied, teaching methods of reproductive, heuristic and research cognitive activity, including control and correction of the results of the decision This ensures the mental and moral development of the student, his formation as an asset. The dictates of time are that learning should be organized with a personal orientation and aimed not only at mastering the content of the subject, but also at mastering the methods, teaching methods of cognitive activity of different levels, which ensure the development of chemical thinking and the conscious application of the acquired knowledge. The purpose of the study is to organize a full-fledged cognitive activity of students, including the assimilation of various components of the content of chemistry, the formation of teaching methods of cognitive activity and the development of a style of chemical thinking. The object of the study is the process of teaching chemistry in primary school. The subject of the study is the cognitive activity of students, the methodology of organizing and managing it by the teacher in the process of teaching chemistry. The organization of a full-fledged cognitive activity will be successful if: to implement a systematic approach to managing the process of organizing a full-fledged cognitive activity, to move from the empirical level of knowledge to the abstract-theoretical level, to establish the relationship, patterns of organization of a full-fledged cognitive activity, which are "hidden" in the real process; cognitive activity will be carried out taking into account the combination of reproductive, heuristic and research cognitive activity of students; to ensure that the methodological means of organizing a full-fledged cognitive activity correspond to the content of its subject; methodological tools will provide the teacher with the ability to manage cognitive activity, and the student - to develop a style of chemical thinking, the full implementation of each component of cognitive activity, which will affect the quality of students' knowledge in chemistry.

Literature review. In order to organize a full-fledged cognitive activity of students, it is necessary to find out its epistemological foundations. At the same time, we try to go beyond classical epistemology and social and historical cognition: we will supplement the theory of cognition with the doctrine of thinking, and we will concretize the cognitive activity of learning cognition, comparing it with social and historical cognition, by the results of psychological, pedagogical and methodological research that are of the greatest interest to our work.

Comparing learning to the socio-historical process of cognition is justified because learning to some extent reflects it. In teaching, the didactically processed

results of socio-historical cognition serve as a means of cognition, its subject with content and purpose. As evidenced by: M. Kornilov, "Teaching is a concise process of social and historical development of the means of cognition"[3, p. 119].

The highest form of human cognitive activity is thinking, which allows us to reflect the surrounding reality in a generalized, indirect way and to establish connections and relationships between objects and phenomena. Generalization is facilitated by the fact that thinking has a symbolic character, expressed in words. Thanks to indirectness, it is possible to cognize what is not directly perceived. Sensations and perceptions reflect mainly separate aspects of phenomena, and only with the help of thinking can one establish internal connections and relationships between them. Performing the functions of a regulator, thinking appears as a higher process that unites all human activity.

Thinking involves a number of operations such as comparison, analysis, synthesis, generalization, abstraction, specification, classification, and system. They are used to cognize, penetrate into the depths of a particular problem facing a person, consider the properties of the elements that make up the problem, and find a solution to the problem. Forms of thinking include concepts, judgments, and inferences.

The main way of thinking development is caused by the development of social practice, from visual, practical thinking to abstract, theoretical thinking.

"All mental operations originated as practical operations and only then became operations of theoretical thinking" [4, p. 214].

The opposite point of view, based on the recognition of the fundamental independence of the way of teaching and the process of cognition, is characterized by O. Maksymov as "complete autocracy of didactics", its independence in relation to the theory of cognition, which reflects the development of cognition in its main essential laws. The main task of didactics is to process the material presented to students in such a way that it is as accessible, understandable, and easy to learn as possible. This point of view leads to the positions of naturalistic psychology and pedagogy, whose supporters are guided by the attitude of "starting from the child." The mistakes of this point of view are rooted in the gap between the logical and the historical.

This leads to the need to recognize the unity (and not the same) and difference, rather than the complete heterogeneity of the path of learning and the process of cognition. For a long time, when clarifying the relationship between learning and socio-historical cognition, the center of gravity was shifted to the aspect of the structure of cognition, to the disclosure of its stages.

"The origins of cognition lie in the active influence of people on nature, the processing of nature's substance, and the productive use of the properties of things. This or that method of practical activity is at the same time a way of communication between people, which preserves and provides them with the objects of their activity in a general form." [6, c. 285].

The general course of human cognition has a three-phase rhythm: direct contemplation, analysis, and synthesis, which was studied in detail by F. Engels in his works. This course of cognition can be described as follows. At the first stage, the object appears to the subject as something directly given. The sphere of cognition

includes only that which can be studied in this object directly, without influence on it from the researcher himself, that is, through live, direct contemplation, without direct interference in the internal areas of the object under study, without violating the integrity of this object. With the help of sensations, perceptions, and ideas, the external side of phenomena is recorded, and the singular in the real world is cognized. At the same time, the purpose of knowledge is not only to gain knowledge about the properties of things, the way they exist, but also to learn the laws that reflect the external manifestation of things.

At the second stage of cognition, the observer turns into an experimenter who, using various techniques and methods, influences the object under study in order to reveal its reaction to external influences in order to penetrate its essence. This stage is most fully manifested in the analysis, in the physical or mental dismemberment of the object into its individual parts, abstractly distinguished sides. However, this artificial dismemberment is not carried out in an arbitrary manner, but in strict accordance with the laws of formation, structure and existence of the object in question, taking into account the way its parts are connected to each other within the whole.

At the third stage, when the task of analysis is completed, the researcher faces an even more cognitively complex task - the assembly of the subject under study as a whole from its parts, i.e., it is necessary to carry out a synthesis that enriches knowledge about the subject under study.

The dialectical way of cognition of truth, cognition of objective reality - "from living contemplation to abstract thinking and from it to practice" - finds a concrete application in the cognitive activity of students. O. Yaroshenko characterizes it as follows: "The first stage of educational knowledge can take place as a sensory perception of concrete and visual material, as a perception of abstraction and symbolism, as a preliminary acquaintance with practice, with life.

Stage II consists of summarizing the material and drawing conclusions, systematizing and evaluating new concepts and incorporating them into the general system of knowledge that is part of the subject matter, and new abstractions, formulating and deepening beliefs and feelings. Knowledge is transformed from the subject of study into one's own views and beliefs.

The sixth stage is "application of knowledge and solving specific problems. This stage is important not only for developing the ability to apply knowledge, but also for a more in-depth knowledge and evaluation of theories." [5, p. 244].

Trying to draw a correspondence between the course of social and historical cognition and learning, V. Novytska notes that the step-by-step process of cognition is not preserved in an unchanged form in the cognitive activity of students. In it, all stages of the cognitive process are intertwined, interdependent, and there are various intertransitions between them. "Pupils' cognition is based on vivid impressions, observations of the world around them, but whether these processes are initial, starting points in this act of cognition or appear later, based on the hypothesis presented, depends on the subject content, the nature of the task and a number of other factors." [6, p. 245].

Modern didactics, based on the philosophy of cognition, considers these processes as a whole: figurative and conceptual, sensual and logical, concrete and abstract, allowing for various intertransitions between them.

By extracting the general and the essential from the data obtained with the help of the senses, a person, on the basis of analysis, synthesis, judgment and inference, cognizes the laws of the world around him or her, establishes connections and relations between the objects being cognized. Sensual and rational cognition are in unity, complementing each other.

Rational is a form of reflection of cognition, while empirical and theoretical are levels of cognition. At the empirical level, rational thinking is determined by the results of sensory experience. At the level of theoretical cognition, the role and ratio of the sensory and rational moments in the reproduction of objects changes, while thinking serves not only as a form of expression of the results of sensory experience, which also occurs at the empirical level, but also as a means of achieving a new result that goes beyond direct cognition [7, p. 425].

Comparing theoretical cognition with its opposite, empirical cognition, we note its peculiarity that it is generated by the essence of the object being cognized and is conditioned by the practical necessity of reflecting this essence. While the empirical level considers what lies on the surface, the theoretical level is tied to the essence that lies in the depths of the object, hidden from the external gaze.

As different opposites, the empirical and theoretical levels of cognition are in a dialectical relationship, that is, they both deny and assume each other. Forming historical stages of cognition, they act in modern thinking as links that logically follow each other. "Human cognitive activity originates and develops initially as a side, a moment, an aspect of his practical activity. Only then does it stand out from the practical activity in which it is initially intertwined as a special theoretical activity. Even after being separated, theoretical activity retains, however, a connection with practical activity, comes out of practice, is subject to its control, in turn, influencing and controlling it."

Aims. The purpose of the study is to organize a full-fledged cognitive activity of students, including the assimilation of various components of the content of chemistry, the formation of teaching methods of cognitive activity and the development of a style of chemical thinking. The object of the study is the process of teaching chemistry in primary school. The subject of the study is the cognitive activity of students, the methodology of organizing and managing it by the teacher in the process of teaching chemistry.

Methodology. The methodological significance of the "level" approach to the analysis of the path of cognition is that it allows us to solve the problem of the optimal relationship between theoretical and empirical levels of knowledge in the learning environment. The correct understanding of such issues as: 1) the epistemological function of the image-model; 2) the relationship between formalization and visual images; 3) the role of instructions in cognitive activity and many others.

Finding internal connections and regularities between parts of the objects under study is associated with the theoretical level of cognition. In this regard, the author

notes that at present, explicitly or implicitly, it is now believed that when mastering new content of knowledge, the main purpose of learning is to form in students a theoretical way of thinking that operates with abstract concepts and their symbolic models. The conditions necessary for the formation of theoretical thinking, such as the use of problem-based learning and the deductive way of studying a subject, of course, cannot be absolutized. The implementation of the theoretical method of learning involves a special organization of students' cognitive activity. This requires the transformation of educational material and its presentation in the form of educational tasks, the purposeful formation of students' style of chemical thinking, and familiarization with the methods of knowledge acquisition.

The implementation of the theoretical method of learning based on the psychological and didactic principles developed by M. Kornilov and O. Bilodid involves the organization of cognitive activity based on the involvement of students in the transformation of educational material, familiarizing them with the origin of knowledge by highlighting the most fundamental, basic concepts.

The problem of truth is central to epistemology. For epistemology, feelings, concepts, intuition, doubt, etc. are the means of achieving truth. At every stage of historical progress, cognition is relative. The sum of relative truths makes up more and more complete knowledge. Practice plays an important role in the process of cognition. It drives cognitive tasks, provides the basis for cognitive activity, and serves as a criterion of truth. "Science is a system of objectively true knowledge that enriches practice and is verified in it" [8, p. 268].

The contradictions between theory and human subject matter and practice largely determine the ability of science to improve and develop, leading to the emergence of new knowledge.

The most common contradiction in learning is the contradiction between a student's personal experience and the scientific knowledge acquired at school. Using this contradiction, the teacher achieves a significant effect in the student's cognition. However, the main driving force of the learning process, according to G. Shchukina, is an internal contradiction. She points out: "Learning cannot stand still, it must necessarily lead students to a more complete and deeper mastery of the truth, so the constant complication of learning tasks is inevitable. However, to fulfill more complex tasks and requirements, the previous level of students' capabilities is insufficient. To resolve this contradiction, students need to achieve higher levels of knowledge, skills, and motivation. On the basis of the driving contradiction, the process of students' transition from knowledge to knowledge, the process of more perfect cognition of the truth takes place." [9, p. 214].

A. Shapovalov identifies the following contradictions that are the driving force for students to acquire new knowledge in chemistry: a) between students' existing theoretical concepts and new facts, for example, they know that the properties of substances depend on their composition, but then they learn about the facts when substances with the same composition have different properties; b) between known facts and new theoretical knowledge, students know that carbon is a tetravalent element, but when they learn about the electronic structure of the carbon atom, their

previous ideas seem to be refuted; c) between a consequence from theory and observed experience, based on the structural formula of benzene, it can be concluded that it is characterized by reactions of unsaturated compounds, but the experiment does not confirm this assumption; d) between possible different consequences from theories – following the principles of the theory of structure, two structural formulas for ethanol can be derived, but it is obvious that only one of them must be true; e) between different facts that students learn about substances of a homologous series have common properties, but the first member of the series usually has distinctive features; steel is obtained by "burning" some chemical elements from cast iron, but the country produces more steel than cast iron. [10, p. 199].

Identification of such contradictions arising from the logic of the subject content eliminates the need to resort to artificially creating problem situations, which are sometimes recommended in the literature and are common in school practice.

When teaching, it is necessary to bring students to the realization of contradictions, to cause the need to resolve them, which is an incentive for gaining new knowledge and advancing students in the study of chemistry.

"Epistemologically justified is such teaching that allows students to understand the essence of the dialectical relationship between the part and the whole. Teaching to identify the relationship between the part and the whole can be seen as one of the areas of teaching cognition."

Solving the problems of modern education makes it increasingly important to address the problem of the relationship between scientific knowledge and learning. In conditions when educational information is rapidly growing and updating, while the time allotted for studying basic subjects is decreasing, teaching students to learn is of great importance for maintaining interest in learning and forming deep knowledge.

The issues of the dialectic of scientific cognition and learning were covered in the journal "Chemistry: Teaching Methods". The most complete comparison of learning and scientific cognition was given by O. Baram in his monograph. The author revealed the peculiarities of the manifestation of a number of important factors of cognition of the peculiarity, the relationship between theoretical and practical material, presentation of knowledge, scientific and educational explanation, etc." and action in the learning process.

We do not aim to comprehensively consider the problem of the relationship between scientific cognition and learning. We will focus on the aspects that are relevant to our study. We will analyze the relationship between scientific cognition and learning from the standpoint of the content and procedural aspects that are most important for subject methods.

The content and structure of academic subjects is based on the content of science and social experience. "The logic of the development of chemistry shows that the achievement of truth went from the simple and accessible in cognitive terms to the complex, from the less profound to the deeper. A school subject is a didactically processed system of knowledge and skills selected from the field of science." The content of education, based on social experience, is a system of four types of content: 1) knowledge about nature, society, technology, human beings and ways of doing

things; 2) experience of doing things, i.e. realization of knowledge about them; 3) experience of creative activity; 4) experience of emotional and sensual attitude to the world and its objects [11, p. 344].

The lag of school education from the "cutting edge of science" is inevitable, but up to a point. "If academic subjects cease to reflect the cardinal directions of modern science, new ways of knowing, then in the end this may result in irreparable losses for society, as school graduates will be insufficiently prepared for work."

The school subject of chemistry is a part of the cycle of natural science disciplines that covers the basics of the relevant basic sciences. Solving the problem of defining these basics, and even reflecting them in the subject, L. Lipova points out that the content of the subject should be selected from the scientific and practical knowledge accumulated by society, the scientific nature of which is not questioned, at least at the school level. The principles of scientificity, accessibility, and systematicity of educational material serve as certain regulators that normalize the design of a course.

Theoretical material theories, laws, and concepts in the content of secondary chemical education are the main didactic unit of presenting the basics of science. The study of the process of changing one theory to another and the formation of a new theory in science and education shows that the emergence of new theories in science is associated with the implementation of a scientific revolution, which follows the scheme [12, p. 412]:

-basing science on theories that allow us to reflect and explain the real world;

- accumulation of contradictions in objects and phenomena explained by the existing theory;

- study of the accumulated contradictions;

- adaptation to the fact that contradictions become expected;

- the realization of a scientific revolution, the emergence of a more progressive theory than the existing one.

The process of theory formation in science is a complex dialectical transition that includes elements of intuition, the creation of various models and hypotheses, the multilateral verification of which brings them to the rank of theoretical positions. This is true for any scientific knowledge, including chemistry. The sequence of transition from empirical data to theory is shown by the author.

Results. In the process of teaching, new theories can be introduced in two ways: by following the historical sequence of discoveries, similar to scientific cognition, or by teaching theories at the beginning of the course without taking into account the sequence of their discoveries. In the second case, a strong interconnection between the methods of cognition in education and science is ensured. In addition, it provides an advantage in the speed and cost-effectiveness of knowledge acquisition, but it also creates the risk of insufficient provision of a set of facts and incomplete clarity of the connections between them. This leads to formalism of knowledge.

The methodology of effective study of theoretical issues of chemistry in the system of lessons proposed by O. Kharchenko, students are put in such conditions when, like scientists, they have to rethink previously acquired knowledge, realizing that human knowledge is unlimited.

The method of studying theories is also epistemologically justified, as it includes empirical prerequisites, facts and empirical generalizations, the basis of concepts and laws, and consequences. According to this methodology, the sequence of studying chemical theories can be as follows: 1) a general description of the state of knowledge about a chemical element, substance or chemical reaction before the theory emerged; 2) identification of contradictions, the essence of the approach as the basis of the theory; 3) showing the way to resolve the contradictions recorded in its subject area, determining the logical structure of the theory; 4) revealing the importance of the theory in the movement of knowledge to an ever deeper essence; 5) using the theory to explain facts, to systematize and predict facts, to plan and carry out an experiment. Studying a theory in the proposed sequence allows you to find the necessary methodological approaches, to form abstract models and images of the real world.

In both science and education, there is a tendency to strengthen the role of theory in cognition. But there is a significant difference: in science, theories are derived from a large number of facts, and then this theory is used to predict new facts. In education, theories are often declared, and generalizations are made on an insufficient number of facts [13, p. 144].

P. Nechypurenko, comparing the activities of a scientist and a student in the study of facts, notes that a scientist "seeks to maximize the coverage of facts, to build their complete set, selects the essential, rejects the insignificant and builds their interpretation."

Discussion. The study is devoted to one of the topical issues of the theory and methodology of teaching chemistry and school practice - the organization of full-fledged cognitive activity of students.

We perceive full-fledged cognitive activity as one of the effective "levers" of managing the development of students, their knowledge, thinking, speech, and personality as a whole.

The problem of the study was to identify the subject of cognitive activity, methods of organizing and managing it in the process of teaching chemistry.

A general review of the state of the art of the theory of the issue was aimed at clarifying the epistemological foundations of students' cognitive activity, while the theory of cognition was supplemented by the doctrine of thinking, and the educational cognition in the learning process and the cognitive activity of students were compared with scientific cognition and the activity of a researcher. The results of this comparison were concretized by the results of psychological, pedagogical and methodological research, which are somehow related to the problem of our study.

The analysis of cognitive activity was carried out with the aim of forming a definition of the concept of "full-fledged cognitive activity", taking into account such aspects as process, system, value and result.

A general overview of the state of the issue made it possible to determine the content of the subject of cognitive activity.

Cognitive activity as a process is associated with such a component as a learning task.

The procedural aspect of cognitive activity is manifested in solving a learning task

and proceeds in the following sequence: awareness of the problem situation" problem statement - problem solving - formulation of a conclusion in the form of a judgment or inference, The mechanism for implementing this process is operations and forms of thinking. Actions and operations that make up the activity can be considered as "thinking by actions".

The general structure of the activity: needs - motive - goal - task - control and evaluation (internal plan), activity - action - operation (external plan) is specified in the works of many researchers of teachers. Nevertheless, the characterization of cognitive activity as a system does not sufficiently reflect the relationship between teacher and students, the role of each of them in organizing and implementing a full-fledged cognitive activity, that is, it is necessary to identify the methodological aspect in the structure of the cognitive activity system.

The methodological aspect of specifying cognitive activity as a system has shown that each component of its external and internal structure should be the subject of joint activity of the teacher and students. The teacher thinks through the attitudes, promotes the emergence of needs and motives that encourage students to cognitive activity, the nature of which is "set" by the teacher. The student, becoming a "direct carrier" of motives and goals, directs cognitive activity to solve learning problems that arise in the course of the teacher's presentation of the content of the subject being studied in the form of tasks, questions, etc.

To solve a learning task, students must use actions and operations that make up general and specific teaching methods, the formation of which is provided by the teacher. The teacher controls the cognitive activity aimed at solving problems not only by himself, but also involves students in the implementation of the control itself.

The value of cognitive activity is determined by the nature of its implementation (students gain experience in reproductive, heuristic and research cognitive activity), social role and personality-forming capabilities.

Among the qualitative characteristics of cognitive activity, the result is also important, which records the fact that students have mastered the subject of cognitive activity, knowledge, and ways of obtaining it. Prediction, planning of results, requirements for the results of teaching chemistry directly depends on the subject of cognitive activity.

Based on the aspectual analysis of cognitive activity, the definition of "full-fledged cognitive activity" is formulated – it is a motivated activity of a student, carried out by him/her together with the teacher and peers, aimed at mastering the content of the subject, mastering general and specific for the study of heuristic and research cognitive activity, including control and correction of the results of solving cognitive tasks, while ensuring the mental and moral development of the student, forming him/her as an active subject of cognition.

Identification of the subject of cognitive activity required comparison of: 1) the subject of cognition of chemistry in science and the academic subject; 2) the content of chemical education and the main components of the content of chemistry, those teaching methods that can be used to study them at the reproductive, heuristic and research level. At the same time, it is important to establish the relationship between

different components of the subject and cognitive activity.

The subject matter includes not only cognitive processes aimed at learning the basics of chemistry, but also the entire sphere of needs, motives, goals, cognitive tasks, actions and operations, and control of results; they are the subject of cognitive activity. The next component of the subject of cognitive activity is the subject of chemistry, i.e., the changing substance. The content of the subject is holistic, based on three interconnected systems of developing concepts: 1) "Substance"; 2) "Chemical reaction"; 3) "Cognition and application of substances and chemical reactions by humans". Their content is gradually revealed and deepened as scientific theories are studied, succeeding each other, enriched with facts, methods of knowledge, and the language of the science of chemistry.

The conscious implementation of cognitive activity by students includes thinking processes, basic mental operations and forms, but the specificity of the content of chemistry as an experimental and theoretical science determines the peculiarities of chemical thinking, its style.

Comprehending the results of research in private methods aimed at developing students' thinking as a mechanism of educational cognition has made it possible to identify the components that determine the style of chemical thinking.

The components of cognitive activity, the system of chemical knowledge, teaching methods of reproductive, heuristic and research activities, and the style of chemical thinking act in their unity in the learning process as the subject of students' cognitive activity. The content of these components is also the content of cognitive activity, which depends on the methodological support, on the organization of students' joint activities and their management by the teacher.

The main and main problem associated with the process of organizing a full-fledged cognitive activity is the problem of the means by which a student masters the teaching methods of cognitive activity at different levels, the style of chemical thinking, and acquires quality knowledge.

To develop them, it is necessary to know the laws of the holistic process of organizing a full-fledged cognitive activity, which are hidden in the real process.

The above has shown the need to create a theoretical model of the integral process of organizing a full-fledged cognitive activity, various variants of which can be the relationship of goals, means and results.

In accordance with the above, a prognostic model was developed, which includes content-target, procedural-activity and control-evaluation components, in which the goal acts as a system-forming factor.

The study of the model allowed us to identify the systemic, structural, psychological, pedagogical and methodological regularities that underlie the development of tasks.

The developed tasks are divided into two groups, each of which has its own functions.

The first group of tasks ensures the implementation of each structural component of cognitive activity and the development of students' reasoning skills as a means of forming a style of chemical thinking.

Improving the organization of full-fledged cognitive activity is associated with the use of the second group of tasks in the process of teaching chemistry, the implementation of which is aimed at the acquisition of knowledge, the formation of teaching methods that take into account the specifics of different components of the content of chemistry, the combination of cognitive activity of different levels and the formation of a style of chemical thinking.

The identification of the subject of cognitive activity, the development of the data and methods of their use allowed us to specify the results of teaching chemistry: students' acquisition of scientific knowledge about substances, chemical reactions, methods of cognition; mastering the leading ideas and methodological principles that allow them to understand the similarities and differences in various facts, to deepen the explanation of these facts, to see them in development; mastering a set of general and specific teaching methods by which students carry out reproductive, heuristic and research late Summarizing the conclusions that were formulated in this conclusion and presented in the relevant sections, we summarize as follows.

Under the influence of the changes taking place in society, national education is undergoing significant changes that actualize the solution of the problem of organizing a full-fledged cognitive activity based on knowledge of the laws of the above process, development of tools, methods of their use, which allow, on the one hand, to expand the student's educational environment, satisfy his cognitive needs, and on the other - to make him an active subject of cognition, who is able not only to increase the "fund of knowledge", but also to learn how to acquire it at different levels of cognitive development.

A comparative analysis of students' cognitive activity, socio-historical and scientific cognition has revealed the peculiarities of the subject of cognitive activity relevant to students in the study of chemistry, related to the implementation of each structural component of cognitive activity, the system of chemical knowledge, the style of chemical thinking, and teaching methods of cognitive activity. The results of the comparative analysis were used to create a theoretical model of the integral process of organizing a full-fledged cognitive activity and to substantiate the content of its structural components.

1. A theoretical model of the integral process of organizing a full-fledged cognitive activity has been developed, which performs the functions of storing and expanding knowledge about the methodology of organizing this process. The model includes: a) content-target component - provides the connection of all components into a single whole, gives focus and substance to the whole process; b) procedural-activity component - involves the development and use of special tools that ensure the implementation of each structural component of cognitive activity, the assimilation of various components of the content of chemistry in the course of interrelated activities of teachers and students, mastering by students of teaching methods of cognitive activity of different levels, style of chemical thinking.

The study of the theoretical model allowed to establish structural, systemic, psychological, pedagogical and methodological regularities of the integral process of organizing full-fledged cognitive activity: a) correspondence of the structure of the

process of organizing cognitive activity to the structure of the learning process and the general structure of activity; b) the determining role of the goals and content of the subject of full-fledged cognitive activity in relation to the means, methods of their use and learning outcomes; c) the connection of teaching methods of cognitive activity with the nature of the

1. The article reveals a set of general and specific teaching methods by which students carry out reproductive, heuristic and research cognitive activities in relation to various components of the chemistry content. Teaching methods of research cognitive activity include teaching methods of heuristic, reproductive and rely on them. At the same time, there is a connection between the teaching methods of cognitive activity of the same level when studying different components of the content of chemistry. It is noted that as theoretical issues, facts, methods and language of chemistry are studied, general teaching methods are "specified" and specific ones are generalized.

2. It has been found that in order to organize a full-fledged cognitive activity, it is necessary to ensure a combination of its levels: reproductive, heuristic and research, based on their complementarity and competition. The methodology for using the activity approach as one of the ways to implement cognitive activity at different levels is developed and substantiated. The organization of cognitive activity on the basis of the proposed methodology extends not only to the content and nature of cognitive activity, but also to the observance of all its structural components, their logical completeness as the pre-foreseen results of each stage of the lesson.

The means of organizing a full-fledged cognitive activity have been developed, which perform the following functions: a) implementation of each structural component of cognitive activity; b) development of students' ability to reason as a means of forming a style of chemical thinking; c) studying each component of the chemistry content, taking into account the specifics of the organization of cognitive activity, formation of teaching methods, development of the style of chemical thinking reference notes, justification of statements and multicomponent tasks for studying theoretical issues; task maps that allow.

Experimental work has confirmed the effectiveness of the developed holistic process of organizing full-fledged cognitive activity and its methodological support, which manifested itself in higher results of mastering the content of chemistry by students of experimental classes, the formation of their cognitive activity of a productive level, each component determined by and in the positive dynamics of cognitive needs [14, p. 215].

Conclusions. The organization of a full-fledged cognitive activity will be successful if: to implement a systematic approach to managing the process of organizing a full-fledged cognitive activity, to move from the empirical level of knowledge to the abstract-theoretical level, to establish the relationship, patterns of organization of a full-fledged cognitive activity, which are "hidden" in the real process; cognitive activity will be carried out taking into account the combination of reproductive, heuristic and research cognitive activity of students; to ensure that the methodological means of organizing a full-fledged cognitive activity correspond to the

content of its subject; methodological tools will provide the teacher with the ability to manage cognitive activity, and the student - to develop a style of chemical thinking, the full implementation of each component of cognitive activity, which will affect the quality of students' knowledge in chemistry.

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