PEDAGOGICAL SCIENCES

INTERPRETATION OF THE SYSTEM THAT DIRECTS THE FORMATION OF CREATIVE THINKING OF STUDENTS IN SECONDARY SCHOOLS

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Abstract
The article focuses on the importance of modernizing the educational space and working out the theoretical and technological bases of new approaches to the implementation of education, where the problem of the formation of a creative personality is determined as a challenge of the modern era, specifically the IV industrial revolution. it is claimed to be a system that includes scientific research as subsystems through implementation. Based on this position, the authors of the research study focused on the specific characteristics of the subsystems in question, the fact that the scientific cognition (scientific research process) through the implementation of education is essentially the same (with the sign of focusing on the detection of the unknown) and the process of realizing their unity as parts of the unit, philosophical-methodological-logical, psychological, give a scientific interpretation according to cybernetic, didactic principles. In the generalizations presented by them, the interaction of empirical and theoretical knowledge in both subsystems, the historical development logics of education and science, and the existence of constructivism are selected as points of view.

Keywords: creative personality; science; historical, methodological, epistemological, sociological, psychological aspects of science; macroproperties and final functions of science; scientific knowledge; empirical and theoretical knowledge; education; the way of education; system; subsystem; social system.

Relevance of the research topic.

Both the teaching process that instills creative thinking and the research process aimed at uncovering the truth and gaining new knowledge are based on the same cognitive action (system of procedural rules, mechanism). From here, it is logically concluded that the most optimal organizational structure of these areas can be ensured only in the conditions of their transformation into a single process. Although these two areas have historically been relatively independent, they have always been connected. This relationship existed, first of all, in connection with the work of people with high intellectual preparation, potential, erudition capabilities and a wide range of information in the field of science and education. However, it has become a common practice for the education system to separate from scientific structures and acquire an independent structure, to train teachers from among people who are far from science (from the professionalism of those who have confirmed themselves as non-ordinary, competent subjects of scientific research), who do not have enough scientific research habits and sometimes creative thinking. At first glance, it may seem that research is not required of a teacher at the secondary school level. But if it is not really important for a teacher to discover something new in science, at least he should have the ability to rediscover what is known every time with the participation of students. It can be seen from the analysis and generalization of the collected pedagogical experience, observational materials, that the approaches aimed at implementing the process of education in accordance with the process of scientific cognition do not take place in practice, a system that can condition the training of creative personalities-a system that includes the unity of scientific research through the implementation of education does not exist. Therefore, we claim the relevance of the research on the topic "Interpretation of the system that directs the formation of creative thinking of students in general education schools".

Interpretation of collected materials on the research topic. It is not denied that the problem of forming a creative personality (training perfect people for society) is of an eternal nature, and this problem is more prominently determined as a challenge of the modern era, specifically the IV industrial revolution, in this regard, the modernization of the educational space and new approaches to the implementation of education (constructivism) and more perfect options from the point of view of corporatism) it has become necessary to work out the theoretical and technological foundations.

Referring to the "Theory of Healthy Triads" in scientific sources, it is stated that in the formation of students' creative thinking, in other words, in their preparation for life as a creative personality, 1) a healthy family-school-society cooperation, 2) the content of national-spiritual, universal and secular-religious cultural examples in total, 3) systems arising from multilateral human-nature-society interactions are of great importance [6; 32-34]. We say that we are not against this opinion, we even appreciate it when it is appropriate. At the same time, we acknowledge that the idea that "Social beings are constantly in need of being the subject of creative thinking at the level of perfection de-

sired to acquire human qualities" has dominated our understanding. Based on the highlighted idea, our generalization is as follows: students' "acquiring creative thinking in their preparation for life as creative personalities" is a value, which a student with healthy physical and mental capabilities: 1) scientific research on the acquisition and systematization of those that become a demand for everyone and are unknown and 2) thanks to the shared activity (competent scientific research and educational activity) aimed at mastering the knowledge, skills, habits and norms of coexistence necessary for the state, society and the individual, it (the perfection that is ready for the calls of creative thinking, in other words, civilization, the necessary human experience) part of it can be transformed into the subject of the ability to master, preserve and creatively develop.

According to our understanding based on the arguments that we accept as valid, synonymy exists in the essence of the concepts of human experience, culture and civilization. The level of civilization is determined by 1) human experience and 2) culture, whose elements are knowledge, skills, habits and norms of coexistence. The value that turns man into a noble of the earth and gives him the essence of civilization is science and education, which meet the right to exist in a binary relationship. It is possible to say this succinctly: Education received its nourishment from science, and science gained its right to exist thanks to education. This relationship is primarily related to the work of naturalists who have a high intellectual level and competence in both fields.

When we talk about the unification of scientific research and education in terms of the formation of the creative thinking of students, we focus on 1) the level of creative searches contained in science according to the principle of relevance of education, 2) the intersection of science and knowledge systems only in a certain general area, which is scientific knowledge. It is not forgotten here that scientific knowledge is included in the "Science" system, the concept of "knowledge" includes not only scientific knowledge, but also practical knowledge, which means that the latter is included in the "science" system, and creative searches are included in the "knowledge" system.

The system of knowledge does not reflect the point of action. And science appears as an event in the process of scientific research, creativity and research. It should also be noted that looking at science as a system of knowledge and looking for the unique aspect of scientific knowledge compared to other knowledge, the criterion of scientificity, is not enough for the study or interpretation of the "science" system [3].

The experience of a person acquiring knowledge and methods of action, the development characteristics of the student's mental processes (in particular, the dialectic of the analytical and heuristic logic of the mind, the transformation of memory into a thinking process, the creation of images of imagination that compensate for the weakness of concepts in the process of searching for the unknown, the activation of creative thinking) It prevents the education implementation system to contain different subsystems. One of these subsystems takes a superior position in solving the tasks corresponding to the first two levels of education and is applied. It cannot be denied that a large part of the knowledge in the memory can be obtained in this way. According to our understanding (based on the generalizations made), the structure of knowledge determines the existence of a subsystem in the education implementation system, which includes the provision of knowledge and methods of activity as a result of reproductive activity (student). When we say this opinion, we take into account that the knowledge included in the training material is combined in three groups: generalized knowledge, knowledge about generalized methods of action; concrete knowledge [5;165-166].

The first group includes concepts, laws, principles, rules, etc. includes. Knowledge of this group can be acquired in the following ways: a) understanding, etc. memorizing without understanding its content and essence; b) learning in the form of a ready result, generalization, or rather understanding, etc. opening of its content by the teacher or with the help of the textbook; c) independent acquisition. The second group includes knowledge about the methods and principles used in understanding the essence of objects and events of the real world, as well as relevant concepts, regularities and laws, rules. The teacher should determine the way of mastering the knowledge included in this group in each specific case in an appropriate way (on didactic grounds). Thus, the concept, rule, law, etc. can be mastered by choosing one way of solving the learning problem, and another explanatory-reproductive way. The third group includes facts, terms, dates, names, given quantities, events, etc. includes. The knowledge belonging to this group is not generalizing, it just requires memorization and memorization. The third group of knowledge is usually not acquired through problem-based learning.

The summarization of the research materials gives reason to say that this subsystem, which we are talking about, can be improved based on the application of various projects (technologies) and the more perfect use of the functions of components-"carriers of opportunity".

But even an ideal improvement does not make it a perfect system. Because the characteristic feature of the system that regulates the conditions of mastering the experience of understanding, preservation and creative development of human culture is that it contains the optimal relations of algorithmic and heuristic activities. Of course, the training system that is adequate for this (allowing for some approximation, it can also be expressed by the term "perfect system") should contain both the subsystem in question and regulate the conditions for the independent, problematic assimilation of the new one. Therefore, the perfect system can be formed not by improving the way of acquiring knowledge, but by completing it. [5; 166]

In the subsystem whose nature and functions we are talking about, the student does not act as a subject who constructs (compiles) an algorithm and controls heuristic activities, but as an observer of the mentioned type of activities, and in some cases, they become the executors of some of its structural components. As a result, the student does not develop the necessary level of

knowledge and development to build an algorithm, act as a subject of heuristic and analytical activity.

The process of performing analytical and heuristic activities aimed at identifying the new refers to a certain algorithm reserve and the existence of a solid system of rules. The regulation of optimal relations of algorithmic, heuristic and analytical activity in the subsystem, which includes the study of knowledge and methods of action, is determined by the nature of the problem and the level of difficulty. Algorithmization is conditioned by the necessary demand for the development of algorithmic culture (both for the management and reproductive activity of students, as well as for the conscious observation of the teacher's activities aimed at the search for new things, and preparation for the problematic learning process) in the subsystem that includes the ready transfer of knowledge and activity methods.

We consider it acceptable to call another subsystem of the educational implementation system "a subsystem that contains problematic learning" (according to our subjective opinion, if this subsystem, which stands superior to constructivism, has transformed corporatism into itself, it is currently accepted as a modern training model in our schools, formed "techno- "Democratic-information society", which needs to be further improved at an adequate level, and can be turned into a system that is currently being called "active/interactive learning", where the process of sharing the necessary part of human experience is basically unified with research activity. here the learner's "courage to extract knowledge from knowledge" is manifested).

In the scientific pedagogical sources known to us, the subsystem, which is one of the ways of regulating the optimal relations of active, creative, search-oriented, algorithmic and heuristic activity, based on the problem-based learning activity of students, is included under the name of the concept of "problematic learning"[1;150-151]; [2; 107].

A group of pedagogues and psychologists have tried to attribute the concept of "subsystem containing problematic learning" to one or another system of categories. For example, according to F.Baykov, problem-based learning can be characterized as an active pedagogical process that includes a system of problem situations that is consistently organized and solved as a result of constant, direct and feedback between the teacher and the student. T.V. Kudryavtsev sees the problem-based learning process in the setting of such didactic problems in front of the students that, by solving them, the students acquire both generalized knowledge and the principle of solving problematic issues. In the concept of problem-based learning, V.Okon shows that a set of actions is understood, such as organizing a problematic situation, formulating a problem (with the gradual participation of students themselves in this process), providing the necessary help to students in solving the problem, checking the solution, and finally leading the process of strengthening and systematizing the acquired knowledge[10 ; 38]. Some educators call problem-based learning a method on the basis that any method of learning is always guided by students' activities in problem solving. M.I.Makhmutov, on the contrary, writes that the observation and analysis of numerous lessons of advanced teachers shows that problem teaching is not a method at all. This is a broader concept, a category based on the creative and purposeful application of training in harmony with various teaching principles and methods. While problem-based learning affects the development of students' mental activity to a higher level in the entire learning process, it is not a teaching method and a form of organizing students' activities. M.I.Makhmutov considers it correct to understand problem-based learning as a didactic system based on the inclusion of specific reconciliation of teaching and learning methods and principles specific to the laws of creative assimilation of knowledge and activity methods and important aspects of scientific research. M.Mehdizade is of the opinion that the mentioned concept contains a special type of training. M.Kruglyak also tries to justify that problem-based learning cannot be understood as one of the methods, it is a form of organizing intellectual search during the acquisition of knowledge through problem solving. [9; 280]

Referring to the generalizations we made based on the materials collected during the research, we state that the realization of the unity of the process of scientific research and education implementation is closely related to how these systems are understood. In this regard, the interpretations are different, in our opinion, this diversity does not harm the overall work, but rather it is important. Looking at science as a special field of activity, G.N.Volkov does not include the system of knowledge acquired by the society at each stage of time in the concept of "science" and expresses such an opinion: "The essence of science is not the truths that have already been understood, but the search for them, the study of the laws of nature and society and It consists of experimental research studies aimed at its use. Science in itself is not knowledge at all, it is the activity of society on the production of knowledge, in other words, it is scientific production. Whatever role technology plays in material production, scientific knowledge also plays the same role in spiritual production" [12;121]. Commenting on this idea, Academician S.S. Khalilov writes: The introduction of the concept of "...scientific production" is of great importance for the study of the essence and main features of science. G.N.Volkov tried to justify his position scientifically and to create an analogy with the production process, which is more studied in this work, such an initiative is only commendable".[8 ;81]

According to our understanding, it is the most important condition for the study of science in different aspects to be carried out in a related manner and to be able to complement each other, to define it as a system. American scientist H. Liman writes precisely with this aspect in mind: "Before we distinguish and discuss the philosophical, psychological, or social aspects of science, we should be able to imagine science as a certain whole"[13;13]

There is no example in the human experience of obtaining food from a single source for the implementation of scientific research and education processes. It should be noted that when science and education were not organized as a social system, the first teachers were

among the first scientists. In the form of Plato's Academy,one of the first more or less organized educational institutions, this historical junction looks very beautiful. Along with their works, many classics of science also left followers-disciples and entered the history of science as the founders of a certain school. The school created by him played no less role in N.Bor's popularity than his scientific discoveries. However, this was not possible for all scientists. Even the greatest scientists may not have the skill and desire to teach others their knowledge. A.Einstein, who made great contributions to science with his personal creativity, is the best example of this. A scientist's school, laboratory, etc. in fact, it fulfills the functions of the educational system by serving to continue the researches that have been started, and to transmit ideas and research habits to the new generation. In itself, this is no longer a formal, but an example of creative education.

However, the historically independent organizational structure of the educational system has made it a common practice to train teachers from people who are far from scientific, who do not have scientific research habits and sometimes do not have creative thinking at all. At first glance, it may seem that the compulsion of general education turns what we say into a point of view, and research may not be required from the teacher for the general education level. However, while it is not really important for the teacher to discover something new in science, at least he should have the ability to rediscover what is known every time with the participation of students, he should be able to direct the mental activity of students to the discovery of the unknown by analytical or heuristic types (Forgetting It is impossible that personnel enter science from the ranks of young people who receive high-quality education, otherwise the burden of science will not be lifted, the world will be deprived of opportunities for science.

In order for the teacher to be able to facilitate the provision of the principles of constructivism and cooperativism in the organization of the teaching-cognitive process, it is important for him to know the characteristics of this or that type of activity (in particular, let us emphasize that the analytical and heuristic types of mental activity related to the training problem, the logics of which should take place in the teaching process) is one of the issues. He should know that the structure of the analytical type of mental activity that takes place in the research process: 1) understanding of the difficulty and analysis of the problem situation; 2) identification of the main difficulty; 3) searching for a solution by applying known algorithms or searching for analytical ways; 4) includes the components of the solution and checking its correctness. The structure of the heuristic type of mental activity can be fundamentally different. Its separate stages are close to the analysis, but have their own specifics. The structure of this type is as follows: 1) understanding of the difficulty and analysis of the problem situation; 2) identification of the main difficulty and formulation of the problem; 3) a) searching for solution methods by hypothesizing and their development (designing a new algorithm) or b) making a reasonable hypothesis and finding a solution intuitively; 4) check the correctness of the hypothesis by applying the obtained result to practice. At this time, it should also be taken into account that the second way improves the practice of managing the process of developing the student's mental abilities.[4;72]

The generalization formulated thanks to the analysis of the materials collected during the research gives grounds for concluding that indifference to the unity of the processes of scientific research and the implementation of education not only hinders the preparation of the student for life as a creative personality in the general education school, but also that this undesirable environment seriously damages the further development of science. It is like a "shield" for the youth to come to science. Such an aspect should be taken into account that in our modern age, not only the problems, but also the science itself is getting older. As the famous physicist Max Delbryck said, science grows old, but society remains young. The achievements of science are accumulating, scientific information is multiplying, and the giant tree of science is bowing down as it bears fruit. And the society is gradually being updated, generations replace each other.

Results of the Research

The point is that they cannot be solved by influential people in any field of science, they go beyond the "normatives" of the dominant way of thinking. Since the older generation is firmly attached to that way of thinking, it is powerless to face such problems that require a new solution and a new perspective. Young researchers, on the other hand, are not very firmly attached to the ruling style of thinking and the tenets of normal science, so they sometimes approach the problem from an unexpected position and use new methods. Here, the associative thinking, which is more characteristic of youth, speaks positively. There are many examples of this from the history of science. For example, at the beginning of the 20th century, when a number of physical phenomena could not be explained within the framework of Newtonian mechanics, 25-year-old A.Einstein solved the problem that all prominent scientists of the time could not solve. A little later, when classical mechanics for micro-events did not justify itself, the basic law of new quantum mechanics was discovered by 26-year-old V.Heisenberg. Schelling was 20 years old when he wrote his first poem. Although it seems that we are moving away from the main point here, we should emphasize, based on the information found in scientific sources, that wrong conclusions inherited from our not-so-distant past (due to many objective and subjective reasons) led to the separation of research institutes and higher schools. therefore, the scientific potential of the teaching staff and the teaching opportunities of the scientific workers were not sufficiently used. For example, in our republic, a large number of academicians and doctors of science work in scientific research institutes, while in higher schools, students are often taught the relevant subjects by people with a much lower qualification level. Scientific sources also show that people who are not particularly successful in the field of scientific research are sometimes attracted to universities, which lowers the scientific level of teaching. Adhering to this tradition, higher schools hire their own personnel, people with no scientific research competence, as teachers instead of outstanding experts working in scientific research institutes, and they often try to explain this with the specifications of the higher school, the difference between the educational system and the scientific institution. In this regard, the practice of preparing staff for oneself, which is widespread in our republic and even "justified" as a

good thing, causes great damage to the scientific atmosphere in higher education institutions. (this has a negative impact on the training of personnel, their acquisition of the competence to conduct research in the relevant field). As a rule, when talking about the academy, higher school and field sciences, we are talking about the activities of people with the same rights and the same capabilities in different departments. The comparison is usually made on the basis of statistical indicators: how many doctors of sciences, how many doctors of philosophy, etc. in which field. there is However, depending on the specifics of those fields, the activity of scientists working there should also have certain specifics. For example, if the main function of people working in field science is to adapt the known scientific provisions to the requirements of the production area, to find new ways of application, the function of the academy workers is to acquire new scientific knowledge independent of application, to reveal the truth about reality. [8; 85].

Academician S.S.Khalilov also emphasizes that although the laws on science and education are separate, they should first be considered together, as components of a single system, and only after that, the rules of their relative independent existence should be established, specific legal regulatory systems should be created... When talking about the unified concept of science and education, we do not intend to emphasize that these two fields are extremely close. On the contrary, the goal is to take into account the differences between these two fields... As a result of the fact that the essences of science and education are often confused, even the related laws, as they say, encroach on each other's scope, pretending to legally regulate issues that do not belong to them. [8; 84-88]. We believe that the major reforms carried out, the creation of the Ministry of Science and Education, and other fundamental structural changes will ensure the elimination of the "gaps" highlighted above.

By its nature, the system that directs the formation of students' creative thinking in general education schools is the unity and unification of educational and scientific cognitive processes [11]. The real existence of the mentioned process is possible thanks to the dialectic of the categories of content and form. It is enough to look at the teaching method applied here as a form of cognitive movement of the learning material, which has become a perceived object of the students' needs, and the organizational form as a form of movement in which the teaching method and learning material appear in the place of the content. In the process of implementation of education, if this kind of action is realized, then there is an opportunity for the creative quality of the thinking of the learner. It includes both empirical knowledge as a result of direct interaction with objective reality, and theoretical knowledge obtained using known methods of scientific cognition due to the most abstract thinking.

Theoretical novelty and significance of the study. The interpretation of the nature of the system aimed at the formation of creative thinking of students in secondary schools clarifies the theoretical and technological approaches that determine the place of scientific research in the process of education. This theoretical base can be used as a basis for choosing a more perfect version of the system that can transform the dialectical connection of "goal-content-means-method-organizational form" in the process of education implementation, in the teaching of this or that subject, as a result, "opportunity-movement-new quality" The process of sharing human experience, based on the paradigm, is realized more effectively.

The result. 1) the problem of forming a creative person (turning a person into a subject of creative thinking) is determined as a challenge of the modern era, specifically the IV industrial revolution; 2) the value aimed at the formation of creative thinking of students in secondary schools is a system that includes scientific research as subsystems through the implementation of education; 3) subsystems of the system aimed at the formation of creative thinking of students in secondary schools are specially organized cognitive processes and they have philosophical-methodological, logical-psychological, cybernetic, didactic bases; 4) the efficiency of the system aimed at the formation of creative thinking of students in secondary schools is determined by the level of research experience and management competence of the facilitator; 5) the interaction of empirical and theoretical knowledge, the nature of analytical and heuristic types of mental activity should be selected as a point of view in the management of the system aimed at the formation of creative thinking of students in general education schools.

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