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Problembasiertes Lernen als Werkzeug zur Aktivierung der kognitiven Aktivität von Schülern

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Zusammenfassung: Der Artikel diskutiert eine der aktiven Lehrmethoden - problematisch, in der Lage, die Aktivitäten der Schüler zu aktivieren und eine positive Lernmotivation zu bilden. Der Beitrag stellt die Schwerpunkte der Problemlösungspädagogik dar, deren psychologische Erklärungen, didaktische Grundlagen und Möglichkeiten der praktischen Anwendung in der Bildung dargestellt werden**.**
Stichworte: Problembasiertes Lernen, Problemsituation, Problem, Problematik, Lerntechnologien**.**

Problem-based learning as a tool for activating the cognitive activity of students

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Abstract: Abstract: The article discusses one of the active teaching methods - problematic, capable of activating students' activities and forming a positive learning motivation. The article represents the main points of education through problem-solving, its psychological explanations, didactic basis, and opportunities for practical use in education are presented.
Keywords: problem-based learning, problem situation, problem, problematicity, learning technologies.

Introduction. In the middle of the last century, the directions of education are polarized around two of its characteristics: controllability and the formation of students' ability to “obtain” knowledge on their own. Despite the rapid growth of all kinds of learning technologies, none of them is currently presented in a pure form, one includes elements of the other. However, the necessary requirements for each technology are the upbringing, developing nature of training and the activity of the subject of learning.

Methodology. Based on the results of psychological and pedagogical research, we can confidently state that the traditional model of the educational process does not fully form a functionally competent specialist who is able to effectively solve new problems that arise both in the professional sphere and in everyday life.

Results: At one time A.A. Verbitsky noted that the most characteristic direction of increasing the effectiveness of university education is the creation of such psychological and pedagogical conditions in which a student can take an active personal position and fully reveal himself as a subject of educational activity. For this, each person must be provided with a kind of creative space-time field for the

realization of their abilities in interaction with the world and oneself [1]. However, this is not enough for the creative self-development of the individual. Nominated by L.S. Vygotsky's thesis on the leading role of education in relation to mental development speaks of the need to comply with one more condition: the active educational and cognitive activity carried out by the individual should unfold in the "zone of its proximal development." Only in this case, the assimilation of knowledge, skills and abilities can lead to significant qualitative changes in the student's motivational sphere and the development of his abilities.

In the process of teaching students, it is necessary to conduct systematic work with them to develop cognitive activity within the framework of student-centered learning. The student's cognitive activity should reflect the state of a person thirsting for knowledge, being in research search, developing his cognitive interests.

Educational information is most actively perceived when there is a need for its perception. The same content of the studied subject of the same degree of complexity, in the same volume, can be assimilated in different ways, depending on the way it is presented, the motives of perception and the interest of students.

To a large extent, the formation and development of cognitive activity depends on the organization of education at the university. Recently, active teaching methods have become widespread, which act as objective means that help to carry out and intensify cognitive activity in the learning process.

First of all, they mean non-traditional forms, methods and means of teaching. These include: problem lectures, seminars-discussions, analysis of specific professional and life situations, methods of mathematical modeling, business and role-playing games, as well as various forms of research work of students.

Active teaching methods are ways to activate the educational and cognitive activity of students [2], which encourage them to actively think and practice in the process of mastering the material, when not only the teacher is active, but students are also active.

Let's dwell on one of such active methods as problem-based learning .

Analysis: According to A. A. Verbitsky, the use of problem-based teaching in higher education allows to form not only cognitive, but also professional motives and interests, educate systemic thinking, create a holistic view of professional activity [3].

As one of the effective levers, problem-based learning is able to activate students' activities, to form their positive learning motivation.

Distinctive characteristics of problem-based learning are given in table. 1.

Table 1

CHARACTERISTICS OF TRADITIONAL LEARNING AND PROBLEM-BASED LEARNING

Traditional learning	Problem-based learning
1. The material is given ready-made, the teacher pays attention primarily to the program	1. Students receive new information in the course of solving theoretical and practical problems

2. In the oral presentation of the material or through the textbook, gaps, obstacles and difficulties arise due to the temporary exclusion of the student from the didactic process	2. In the course of solving the problem, the student overcomes all difficulties, his activity and independence reach a high level here.
3. The rate of transfer of information is focused on stronger, average or weaker students	3. The rate at which information is transmitted varies by student or group of students.
4. Control of school achievements is only partially connected with the learning process; he is not an organic part of it	4. Increased student activity contributes to the development of positive motives and reduces the need for formal verification of results
5. There is no opportunity to provide all students with one hundred percent results; the greatest difficulty is the application of information in practice	5. Teaching results are relatively high and stable. Students can more easily apply the knowledge gained in new situations and at the same time develop their skills and creativity

The basic concepts of problem-based learning include: "problem situation", "problem task", "problem", "problematicity", "problematization".

Problematicness is a condition for the realization of the learning goal and can exist in a latent and expressed form, that is, it can be internal and external.

A problematic situation is a way of creating problematicity (a way of revealing an objectively existing problematicity) and fixes the moment of the subject's appropriation of an object containing problematicity. It can be expressed explicitly or implicitly.

A problem task is a means of creating a problem situation and can be formalized in text data. It has a shell, materialized in its formulation (oral or written), focused on the needs and capabilities of the subject.

A problem task is not just a description of a certain situation, including a characteristic of the data that make up the condition of the problem and an indication of the unknown, which should be disclosed on the basis of this condition. In the problem task, the subject himself is included in the task situation. In other words, the subject is in a position of intellectual difficulty, from which he himself must find a way out by questions: "how?", "Why?", "What is the reason?"

The highest degree of problematicity is considered to be such an educational situation in which the student himself poses a problem, finds a solution himself and checks the received correct answer. In educational practice, this rarely happens.

The research results have shown that traditional teaching methods lead to the formation, first of all, of external motives of educational activity, but if problem-based teaching is mainly used, then this quite effectively affects the formation of educational and cognitive motives among students.

The methodology of problem-based teaching is aimed mainly not at the teacher's presentation of ready-made knowledge and their reproduction, but at the independent mastery of knowledge by students in the process of active cognitive activity. In other words, it is learning by activity. It is in vigorous activity, guided by a teacher, that students acquire the necessary knowledge, skills, and abilities for their professional activities, and their creative abilities develop. Problem-based learning is based on dialogical communication both between the teacher and the students, and between the students themselves. And in the process of dialogue, communication skills develop, the ability to solve problems collectively, students' speech develops.

The implementation of problem-based learning involves the achievement of the following goals:

- to draw the attention of students to the issue, task, educational material, to arouse their cognitive interest and other motives of activity;
- to put students in front of a feasible cognitive difficulty, overcoming which would activate mental activity;
- to expose to students the contradiction between the cognitive need arising in them and the impossibility of satisfying it through the available stock of knowledge, skills and abilities;
- to help students determine the main problem in a cognitive issue, task, task and outline a plan for finding ways to get out of the difficulty that has arisen, encourage them to actively search for activity;
- to teach to look for the most rational ways out of the situation of difficulty. The correct use of problem-based learning ideas in the educational process not only helps to find a solution to the problem problem, but also helps students see, understand and formulate the problem contained in this problem or caused by its statement.

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Problem-based learning is one of the most promising areas for the development of the creative abilities of an individual, which is so necessary for a modern specialist. Problematic learning as a creative process is represented by the solution of non-standard scientific and educational problems using the same non-standard methods. In the search for the same non-standard ways of solving these problems, thought processes are activated, which are the core of cognitive interest. The educational process is carried out more actively in those cases when it is associated with the solution of problem tasks and situations, and the problems have a motivational basis, including a keen interest in the subject of study [4]. Thus, problem-based learning is both a means for the formation of deep cognitive motivation in students and a means by which their mental activity is determined.

The purpose of problem-based learning is to formulate and solve theoretical or practical problems by students that have not previously been solved by them. The proposed tasks (problems) have a wide range of complexity - from fairly simple

educational and subject tasks to research and solution of original scientific and applied problems of a complex nature.

The leading link in problem-based learning is the problem situation. A problem situation is the starting point of thinking, a source of creative thinking.

A problem situation is an intellectual difficulty that arises in a person in the case when it is difficult for him to explain some phenomenon, fact, process, or it is impossible to achieve a goal by known methods. It is the problematic situation that helps to evoke a certain cognitive need among students, to give the necessary direction to their thoughts and thereby create internal conditions for the assimilation of new material [1]. The analysis of the problem situation leads to the synthesis and generalization, to the formulation of the problem. At the same time, the data and the sought-after, conditions and requirements are fixed, the ratio of which determines the entire course of thinking. The search for means of analyzing the conditions of the problem begins with the actualization and systematization of previous knowledge and methods of action, which in past activities led to success in similar situations. Knowledge actualization is also an analysis and search for means to achieve a goal. "An absolutely new task, not based on the student's previous experience, excludes the possibility of active searches for its solution."

In other words, the problematic situation stimulates the active mental activity of a person, prompting him to search for new ways of explanation or action, and thereby is a powerful factor in the formation of cognitive activity. A problem is always an obstacle. In the process of solving the problem, questions of a reproductive nature arise that require the reproduction of previous knowledge, precisely the knowledge that is needed to solve this problem. In many cases, the available knowledge is insufficient to find what you are looking for. Overcoming obstacles is movement, a constant companion of development. It is the problematic situation that helps to evoke the cognitive need of the student, to give him the necessary direction of thought and thereby arouse a personal cognitive interest in solving certain cognitive tasks, to create internal conditions for the development of creative and commutative abilities, to ensure the possibility of attracting students to independent cognitive activity, etc. e. The main element of a problem situation is the unknown, the new, that which must be open for the correct performance of the task, for the performance of the desired action.

The creation of problematic situations gives rise to the need to discover a new, yet unfamiliar, regularity of the object. The desire to satisfy this need is a manifestation of cognitive activity.

Discussion: E. V. Kovalevskaya examines one of the central issues of problem-based learning - the issue of "appropriation" of objective problem situations, subject to their compliance with the cognitive and communicative needs and capabilities of students and if accepted by the teacher. The assignment process can be optimized based on the formation of students' skills in solving problem situations and the skills of teachers to lead this process. The search skills of students and teachers were based on the stages of solving the problem. Students' problem-solving skills include:

1) the ability to see problems and pose them yourself;

2) the ability to create a hypothesis of a solution, evaluate it, passing to a new one in case of unproductiveness of the original;

3) the ability to direct and change the course of the decision in accordance with their interests;

4) the ability to evaluate your decision and the decisions of the interlocutors. The skills of teachers to manage the process of resolving problem situations are reduced to the following: 1) the ability to foresee possible problems on the way to achieving goals in a problem situation; 2) the ability to instantly reformulate a problem situation, facilitating or complicating it on the basis of regulating the number of unknown components; 3) the ability to choose problem situations in accordance with the train of thought of those who solve the problem; 4) the ability to unbiasedly assess the options for decisions of students, even in the case of a discrepancy between the points of view of students and teachers.

Problem-based learning has a number of advantages over traditional learning, as:

1) teaches to think logically, scientifically, dialectically, creatively [5];

2) makes the educational material more evidence-based, thereby contributing to the transformation of knowledge into beliefs;

3), as a rule, more emotionally, evokes deep intellectual feelings, including a sense of joyful satisfaction, a sense of confidence in one's capabilities and strengths, therefore, captivates schoolchildren, forms a serious interest of students in scientific knowledge;

4) it has been established that independently "discovered" truths, patterns are not so easily forgotten, and in case of forgetting, independently acquired knowledge can be restored faster.

Problem-based learning is related to research and therefore involves solving a problem over time. The student finds himself in a situation similar to that in which there is an actor who is solving a creative problem or problem. He constantly thinks about it and does not leave this state until he solves it. It is due to this incompleteness that solid knowledge, skills and abilities are formed.

Conclusion. The disadvantages of problem-based learning can be attributed to the fact that it always causes difficulties for the student in the educational process, therefore, it takes much more time to comprehend and search for solutions than with traditional teaching. In addition, as in programmed teaching, the development of a problem-based learning technology requires a great pedagogical skill and a lot of time from the teacher. Apparently, it is precisely these circumstances that do not allow the widespread use of problem-based learning . At the same time, problem-based learning meets the requirements of our time: to teach by research, to research by teaching. This is the only way to form a creative personality, that is, to realize the main task of pedagogical work.

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