

SECTION 9. THEORY, PRACTICE AND TEACHING METHODS**9.1 Using the method of creating problem situations in the process of teaching professional disciplines**

Modern pedagogical science is in the process of constant development: as the role of man in culture, economy and all spheres of social relations changes, the goals of education change, pedagogical methods improve, new ideas appear.

In the theory and practice of pedagogy today there are a large number of different concepts, theories, approaches to learning, based on certain educational goals, on certain features of the transfer or acquisition of knowledge. Learning technologies are characterized by rational organization of educational activities, the ability to obtain the desired result at the lowest cost, the introduction of systems thinking. Such technologies allow to make the educational process manageable with orderliness of actions and guarantee achievement of pedagogical purposes.

The task of the modern school is the formation of a harmoniously developed personality. If learning leads to the development of creative abilities, then such learning can be equated to developmental learning, and the teacher, based on knowledge of the patterns of development of thinking, special methods carry out purposeful work to form mental abilities and cognitive needs of students in learning. Such training is problematic.

Problem-based learning arose as an attempt to overcome the main shortcoming of traditional learning, which exploits a person's memory and virtually eliminates the possibility of his mental activity. At the core of problem-based learning is the idea of the American educator and psychologist D. Dewey, who believed that instead of instilling false absolutes in students, education should prepare schoolchildren and students to solve problems that grow with their individual experience [484-486].

The purpose of the article is to detection the main aspects of the application of the method of creating problem situations in the teaching of professional disciplines.

To achieve this goal it is necessary to solve the following tasks: analyze the available sources of problem-based learning; to reveal the essence of problem-based

learning technology; describe the conditions of problem-based learning; consider the main forms of problem-based learning in the teaching of professional disciplines; outline the features of the methodology of problem-based learning in the teaching of professional disciplines.

The history of the development of the concept of problem-based learning is associated with the names of T.V. Kudryavtseva, A.M. Matyushkina, M.I. Mahmutov and others [487] and others. The well-known Polish didactic W. Wykon writes in his book "Fundamentals of Problem-Based Learning" that "the more students strive in their work to get on the path followed by the researcher, the better the results are achieved".

Modern approaches are understood as problem-based learning such is the organization of classes that students master professional knowledge, skills, abilities and develop your mental abilities as a result of solving problem situations are offered [488]. Problem learning is a method of learning that combines systematic independent research activities of students with the assimilation of ready-made conclusions of science. The system of teaching methods is built taking into account the purpose and principle of solving the problem; the process of interaction of all participants in the educational process is focused on the development of the student's individuality and socialization of his personality [489-491].

The principle of problem brings together the learning process with the processes of cognition, research, creative thinking. Problem-based learning (like any other learning) can contribute to the goals of achieving a high level of student development, development of the ability to self-study, self-education. Both of these tasks can be implemented with great success in the process of problem-based learning, as the assimilation of educational material occurs during the active search activities of students, in the process of solving their system of problem-based learning.

It is important to note another important goal of problem-based learning - the formation of a special style of mental activity, research and independence of students. The peculiarity of problem-based learning is that it seeks to maximize the data of psychology on the close relationship of learning processes, to model the process of productive thinking, the central element of which is the possibility of creativity and

discovery.

The main characteristic feature of problem-based learning is the problem situation. At the heart of its creation are the following provisions of modern psychology:

- the process of thinking has its source in the problem situation;
- problem thinking is carried out, first of all, as a process of problem solving;
- conditions for the development of thinking are the acquisition of new knowledge by solving the problem;
- regularities of thinking and regularities of assimilation of new knowledge in many respects coincide.

In problem-based learning, the teacher creates a problem situation, directs students to solve it, organizes the search for a solution. Thus, the student is placed in the position of the subject of his studies and as a result he develops new knowledge, he has new ways of acting. The problem situation characterizes a certain psychological state of the student, which arises in the process of performing the task, for which there are no ready-made tools and which requires the acquisition of new knowledge about the subject, methods or conditions of its implementation. The condition for the emergence of a problem situation is the need to identify a new attitude to it, properties or mode of action.

The problem situation includes three main components:

1. The need to perform such an action, in which there is a cognitive need for a new unknown attitude, method or condition of action.
2. The unknown must be revealed in a problematic situation.
3. Opportunities for students to perform the task, to analyze the conditions and discover the unknown.

Types of problem situations that most often arise in the learning process:

- A problematic situation is created when there is a discrepancy between the existing knowledge systems of students and new requirements (between old knowledge and new facts, between knowledge of lower and higher levels, between life and scientific knowledge).

- Problem situations arise when it is necessary to choose from the systems of available knowledge the only necessary system, the use of which can only ensure the correct solution of the proposed problem.
- Problem situations arise before students when they are faced with new practical conditions for the use of existing knowledge, when there is a search for ways to apply knowledge in practice.
- A problematic situation arises if there is a contradiction between the theoretically possible way of solving the problem and the practical impracticability or inexpediency of the chosen method, as well as between the practically achieved result of the task and the lack of theoretical justification.
- Problematic situations in solving technical problems arise when there is no direct correspondence between the schematic image and the design of the technical device.
- Problem situations are also created by the fact that there is an objective contradiction in the schematics between the static nature of the images themselves and the need to read in them the dynamic processes.

To create a problem situation, you need the following:

- The student must be given a practical or theoretical task in which he must learn new knowledge or actions. The following condition should be observed: the task is based on the knowledge and skills that the student has; the unknown to be discovered is subject to mastering a general pattern, mode of action or some general conditions for performing the action; the implementation of the problem task should cause the student the need for already acquired knowledge.
- The problem task offered to the student should correspond to his intellectual abilities.
- The problem task must be preceded by an explanation, which must be mastered in the study material.
- As problem tasks can serve: educational tasks, questions, practical tasks, etc. However, it is impossible to mix a problem task and a problem situation. A

problem task in itself is not a problem situation, it can cause a problem situation only under certain conditions.

- The same problem situation can be caused by different types of tasks.
- The teacher must formulate the problem situation by pointing out to the student the reasons for his failure to perform a practical educational task or the inability to explain to them certain demonstrated facts.

Thus, the main concept of problem-based learning is a problem situation, which determines the cognitive motivation and activates the student's thinking on search and discovery [492].

The general didactic plan considers the main ways to create problem situations [493,494]. Learning practice shows that one of the most effective ways to create problematic situations is to consider paradoxes or sophisms, to present to the learner, contradictory, at first glance, judgments or judgments in which a veiled error is assumed, making erroneous, in fact, the conclusion seems correct. In these conflict, the contradictions on the basis of which problem situations arise are always expressed in a vivid form and are therefore easily felt by students. This, in turn, creates a high emotional mood, there is a personal interest in solving the problem. Students memorize the knowledge gained from solving such problem situations firmly and for a long time.

Implementation of problem-based learning in the process of teaching professional disciplines. Improving the quality of training of future specialists in higher education institutions (HEI) is one of the necessary prerequisites for the effectiveness of modern education in general. We need free-thinking, courageous, able to manage, intelligently build and adjust the attitude of other people and society. Training in the conditions of introduction of the credit-module system needs methodical maintenance which would correspond qualitatively to new level of educational process.

Solving professionally-oriented problem-solving contributes to the formation of interest in mastering the future profession of engineer among students of technical HEI. Under the professionally-oriented task, according to K.V. Vlasenko, we understand the problem, the conditions and requirements of which determine the model of a situation

that arises in the professional activities of an engineer [495].

Problem-based learning is considered as a technology of developmental education, aimed at the active acquisition of knowledge by students, the formation of methods of research, cognitive activity, involvement in scientific research, creativity. Problem-based learning is based on the construction of creative learning tasks that stimulate the learning process and increase the overall activity of students. It forms the cognitive orientation of the individual, contributes to the development of a psychological attitude to overcome cognitive difficulties.

The use of problem-based learning requires certain conditions during the organization of the educational process. Thorough teacher training is required, which requires deep knowledge of the subject, new scientific concepts, approaches; high level of education. It is important to have a method of problem-based learning, which involves the ability of dialogical friendly communication with students; the ability to encourage students to independent cognitive research; attentive attitude to thoughts, hypotheses, statements of students [496].

In the modern theory of problem-based learning there are ten didactic ways to create problem situations, which can be taken by the teacher as a basis for creating a program of problem-based learning:

1. Encouraging students to theoretically explain phenomena, facts, external discrepancies between them.
2. The use of situations that arise when students perform educational tasks, as well as in the study of professional disciplines, ie those problematic situations that arise in practice.
3. Search for new ways of practical application by students of a research phenomenon, fact, elements of knowledge, skills or abilities.
4. Encouraging students to analyze the facts and phenomena of reality that give rise to contradictions between life (practical) ideas and scientific concepts about them.
5. Making assumptions (hypotheses), formulating conclusions and testing them.
6. Encouraging students to compare, contrast and contrast facts, phenomena, theories that give rise to problem situations.

7. Motivation students to pre-generalize new facts based on existing knowledge, which helps to show a lack of knowledge to explain all the facts.

8. Familiarization of students with the facts that led to the formulation of scientific problems in the history of science.

9. Organization of interdisciplinary links in order to expand the range of possible problem situations.

10. Variation, reformulation of tasks and questions [497].

Content and tasks of problem-based learning. Regardless of the choice of method of teaching material and organization of the educational process, the basis of problem-based learning is consistent and purposeful creation of problem situations, focusing the attention and activity of students. The form of presentation of problem situations is similar to that used in traditional teaching: it is a task and a question. However, if in traditional teaching these tools are used to consolidate new learning material and skills, in problem-based learning, they are a prerequisite for cognition [498].

In pedagogy, the problem situation is considered as a state of mental difficulty, which is caused by an objective lack of knowledge and methods of mental or practical activities necessary to solve the problem [499]. It contains a complex theoretical and practical issue that requires study, expansion, research in relation to certain conditions and circumstances that create a situation.

The problem situation usually has two sides:

- subject / content related, to the separation of contradictions of basic knowledge, insufficient amount of certain essential information;
- motivational, which is aimed at understanding the contradictions and stimulating the desire to overcome them, provided that students learn certain new knowledge.

Problem-based learning currently has several varieties, depending on what goal the teacher singles out as the main one. This can be the acquisition of students' knowledge, skills and abilities - then the teacher manages and directs the process of creating problem situations. By increasing the independence of students' knowledge,

the material is better assimilated, and the learning process is intensified by increasing interest from students. Problem-based learning contributes to the improvement of teaching methods and the structure of educational material.

There are different ways to create problem situations. This brings students to face the contradictions in practice, suggestions to find solutions themselves and present different points of view on the same issue. The proposal of students to consider the phenomenon from different points of view encourages them to make their own comparisons, generalizations and conclusions.

The disadvantages of problem-based learning include the fact that it always causes difficulties for the student in the learning process, so it takes much more time to comprehend and find solutions to traditional learning than in traditional learning. In addition, the development of problem-based learning technology requires a great deal of pedagogical skill and time. At the same time, problem-based learning meets the requirements of modernity: teaching by research, research by teaching.

Table 1

Characteristics of forms of problem-based learning

<i>Form</i>	<i>Positive features</i>	<i>Negative traits</i>
Problematic lecture	<i>Teachers: lecture structure: problem-dynamic consideration - generalizations, conclusions; Active search for new knowledge, research, examples.</i>	<i>Teachers: not the universality of the method.</i>
	<i>Students: activation of cognitive interest and effectiveness of learning, applied aspect.</i>	<i>Students: Not all students are ready for active cognitive activity.</i>
Problematic seminar occupation (round tables, focus groups situational exercises)	<i>Teachers: pedagogical efficiency of the seminar is high.</i>	<i>The complexity of the process of preparation for the lesson, the skills of the group moderator.</i>
	<i>Students: creative activity of students increases; a clearly articulated problem creates a need in independence in preparation for the speech; makes you delve into the problem.</i>	<i>are absent</i>

Continuation of table 1

Research work	Teachers: professional self-development; search current topics of scientific work; delving into the nuances of the subjects being taught.	Use depends on abilities students to scientific work (publications) and public speaking students (conferences).
	Students: convergence of independent learning students' research work, creativity development; deep knowledge of the topic.	Lack of cognitive and research activity of students.
Project work (case method, small groups, brainstorming).	Teachers: professional self-development; search engine work, increase of pedagogical efficiency.	Conditional: search for topics for projects, not universality.
	Students: acquisition of teamwork skills, public speaking (project defense), work as a result, the skill of arguing the point of view; development of creative thinking, development of skills make a decision.	are absent

One of the **conditions** for a graduate of a higher educational institution is a developed ability to be creative in solving professional problems, the ability to navigate in unusual situations and conditions, to analyze problem situations, conditions, tasks; develop an action plan; readiness to implement the plan and responsibility for its implementation. One of the most promising areas of formation of these qualities, and at the same time the readiness of masters of technical institutions of higher education for professional activities, is the use of problem-based learning [500].

The development of production and social progress led to the emergence of explanatory learning, which involves first awareness, understanding of the material, and then study it. Such training develops not only memory, but also observation, thinking.

Explanatory and illustrative learning provides students' perception of educational information with its simultaneous generalization, assimilation of concepts, laws, theories. The purpose of practical exercises is to deepen knowledge, form, consolidate knowledge, skills and abilities, apply them in new situations. They include

self-control of the effectiveness of the acquisition of knowledge, skills and abilities, repetition of what has been learned. This type of training focuses on the reproductive acquisition of knowledge, skills and abilities. It provides a comprehensive and strong assimilation of educational information and mastery of practical methods. This type of education is most effective when students lack basic knowledge, and the content of educational material is fundamentally new, is mostly informative, describes ways of practical action and is too complex for students to independently search for knowledge to solve problem situations.

Problem-based learning involves consistent and purposeful cognitive tasks that students solve under the guidance of the teacher and actively acquire new knowledge. The use of theoretical and experimental tasks does not in itself make learning problematic. It all depends on the extent to which the teacher manages to give these tasks a problematic nature and combine the problem approach with other methodological approaches. The task becomes a cognitive problem if it requires reflection on the problem, arouses students' cognitive interest, based on previous experience and knowledge on the principle of apperception.

The problem situation should be considered from two sides, namely the substantive, which is associated with the separation of contradictions of basic knowledge, lack of relevant information and motivational, aimed at understanding the contradiction and encouraging its elimination [501].

Successful solution of problems and tasks depends on the right conditions: students' awareness of the relationships and combinations of concepts and patterns of educational material that must be mastered and applied in the learning process; students should see a real contradiction between the content and requirements of the task: this contradiction should be sought between the "knowledge and ignorance" of students or in informative content; independent solution of students' problems and tasks in the methodology of information disciplines is considered as a higher level of cognitive activity, which allows the development of creative, independent thinking.

Problem-based learning technology is one of the leading pedagogical technologies. It allows you to organize training in which the teacher provides the

optimal combination of independent activities of students with the acquisition of new knowledge. Without a problem situation and problem solving, any methods of independent search activities do not provide sufficient development of creative abilities of students. Given all the above, it can be argued that with the help of the created problem situation and reasoning, students, not having ready answers, find the right solution. Therefore, the development of methods, forms, methods of activating educational and cognitive activities should be carried out on the basis of problems.