METHODOLOGY AND FORMS OF PROBLEMATIC EDUCATION IN THE FOUNDATIONS OF HIGHER EDUCATION

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Abstract: The article reveals the essence of problem-based learning technology; the conditions for providing problem-based learning are characterized; the main forms of problem-based learning are considered; the features of the methodology of problem-based learning are outlined. The purpose of problem-based learning is the assimilation of not only the results of cognition, but also the very path, the process of obtaining these results (mastering the methods of cognition). It also includes the formation, development of the intellectual, motivational, emotional and other areas of the student, the development of his individual abilities. It is an effective means of overall development of students. The essence of problem-based learning is the systematic independent search activity of students with the assimilation of ready-made conclusions of science, and the system of teaching methods is built taking into account goal-setting and the principle of problematicity.

Keywords: Educational Process. Higher Education. Educational Activity.

1 Introduction

One of the most important problems of didactics - the problem of teaching methods - remains relevant both in theoretical and directly in practical terms. Depending on its solution are the educational process itself, the activities of the teacher and students, and, consequently, the result of education in higher education as a whole. At the present stage of development of our society, the social need for creative individuals who think outside the box has increased more than ever. The need for the creative activity of a specialist and developed technical thinking, for the ability to design, evaluate, rationalize equipment and technology is growing rapidly. The solution of these problems largely depends on the content and technology of training future specialists. In the pedagogical process, innovative teaching methods provide for the introduction of innovations in the goals, methods, content and forms of training and education, in the joint activities of the teacher and the student. These innovations may be specially designed, already developed, or newly introduced through pedagogical initiative. The main task of a higher educational institution at the present stage is to train specialists who are able to respond non-standard, flexibly and in a timely manner to changes that are taking place in the world. Therefore, to prepare students for professional activities in the future, innovative teaching methods are used at the university. One of these methods is problem-based learning. Problem-based learning allows a person, on the basis of the available diverse information, to develop their own positions, to develop their attitude towards unacceptable points of view, i.e. to form an informational outlook, which is open for clarification, deepening, change. Issues of problem-based learning have been considered by various authors since the beginning of the last century. The peak of interest in problem-based learning technology occurred in the 70s and is currently growing again. Since the strategic task for higher education is to train a competent specialist who is able to act effectively outside of educational situations, to solve typical and problematic tasks that arise in their own professional activities. All of the above indicates the undoubted relevance of the topic under consideration. The purpose of the article is to analyze the literature data and identify the main aspects of the technology of problem-based learning in higher education. Iasechko, Iasechko S., Smyrnova (2021). Problem-based learning is a way of organizing active interaction between the subjects of the educational process (students) with problem-represented learning content. In this process, they become familiar with the objective contradictions of science, social and professional practice and ways to resolve them, learn to think, enter into productive communication relationships, and creatively assimilate knowledge. Problem-based learning can be called learning to solve non-standard problems, during which students learn new knowledge, skills and abilities. Problem-based learning can also be represented as a system of techniques that provide purposeful actions of the teacher to organize the inclusion of the mechanisms of thinking and behavior of students by creating problem situations. Polat (2021).

The goal of problem-based learning is to master not only the results of scientific knowledge, but also the path itself, the process of obtaining these results (mastering the methods of cognition), it also includes the formation and development of the intellectual, motivational, emotional and other areas of the student, the development of his individual abilities, that is in problem-based learning, the emphasis is on the overall development of the student, and not on the transmission of ready-made conclusions of science to students. Problem-based learning is the modern level of development of didactics and pedagogical practice. It is an effective tool for the overall development of students. "It is called problematic not because students learn all the educational material only by independently solving problems and "discovering" new concepts. Here there is an explanation of the teacher, and the reproductive activity of students, and setting tasks, and performing exercises. But the organization of the educational process is based on the principle of problematicness, and the systematic solution of educational problems is a characteristic feature of this type of learning. Since the whole system of methods is aimed at the overall development of the student, his individual abilities, problem-based learning is a truly developmental learning." Problem-based learning is a type of developmental learning that combines the systematic independent search activity of students with the assimilation of ready-made conclusions of science, and the system of teaching methods is built taking into account goal-setting and the principle of problematicity; the process of interaction between the teacher and students is focused on the development of the student's individuality and the socialization of his personality. The core concept of problem-based learning is a problem situation that causes the generation of cognitive motivation and thinking of the student, aimed at searching, discovering. Currently, there is no unified theory of problem-based learning, although this issue has been sufficiently worked out, and there is no single point of view on the concept of "problem situation". The problematic situation, as a rule, has two sides: a) subject-content, associated with the isolation of the contradiction of basic knowledge, the lack of some essential information; b) motivational, aimed at understanding the contradiction and awakening the desire to eliminate it, provided that students acquire some new knowledge. The levels of problem-based learning depend on the content of the educational material (the ability to create problem situations of varying degrees of difficulty) and the type of student's independent actions. According to these features, experts rightly distinguish four problems: the level that determines reproductive activity; a level that ensures the application of previous knowledge in a new situation; reproductive-exploratory level; creative level. There are two types of problem situations: pedagogical, which is

created with the help of activating actions, questions of the teacher, emphasizing the novelty, importance, beauty and other distinctive qualities of the object of knowledge; psychological, the creation of which is purely individual. Under the problem situation is understood: the ratio of contradictory external and internal circumstances and conditions of activity of an individual or group that do not have an unambiguous solution; a form of connection between the subject and the object of cognition, which ensures the generation of his thinking on the basis of a situationally emerging cognitive need; and neither too easy nor too difficult cognitive task creates a problem situation. Iasechko, Shelukhin, Maranov (2021). A problem situation is generated by an educational or practical situation that contains two groups of elements: data (known) and non-data, new (unknown) elements. A problematic situation means a state of intellectual difficulty, in which a person feels the need to get out of the difficulty that has arisen, to resolve it. Therefore, the problem situation is one of the main means of enhancing the learning activities of students. A problem situation arises most often when there are several solutions with limited information, initial data.

The basis for creating a problem situation is a contradiction. The problem situation characterizes the interaction of the subject and his environment, as well as the mental state of the cognizing personality, included in a contradictory, probabilistic environment. Awareness of any contradiction in the process of activity in this environment (for example, with the help of existing knowledge) is experienced by the subject as an intellectual difficulty and leads to the emergence of a need for new knowledge that would allow resolving the contradiction.

Problem situations are created in the following way: contradictions in information, methods of action are revealed, causal relationships are determined. For example, there is a fact and the need to explain it; the contradiction between worldly representation and scientific interpretation of facts; contradictions associated with the need to apply knowledge in specific conditions; contradictions associated with the limited initial data.

The main ways of creating problematic situations include the communication of information (basic knowledge); comparison of facts, facts, phenomena are analyzed, questions are raised, tasks are presented, etc.

Techniques and ways to create problem situations:

Encourage students to explain phenomena, facts, their external inconsistencies, contradictions.
An incentive to choose the correct answer and justify it.
The transition from lonely facts to generalizations.
Comparison of controversial facts, phenomena.
Solving contradictions between possible ways of solving the problem and the practical impracticability of the chosen method of activity.

The problem - (translated from Greek - "task") - a theoretical or practical issue that requires study, resolution, necessarily implies a contradictory situation between data (facts, etc.) and the requirement to find the unknown. Problems are divided into natural and special, deliberately created (scientific and educational), industrial, social, educational. A problem (task) is an objective phenomenon, for the student it exists from the very beginning in a material form (in sounds or signs) and turns into a subjective phenomenon only after it is perceived and understood by the student in the form of an educational problem. Iasechko, Kharlamov, Skrypchuk, Fadyeyeva, Gontarenko, Sviatnaia (2021).

An educational problem is a subjective phenomenon and exists in the student's mind in an ideal form, in thought, just like any judgment, until it is expressed in the sounds of the language or signs of writing. The main elements of the learning problem are the "known" and the "unknown" for the student. The psychological essence of the educational problem lies in the fact that it is the content of the problem situation that arises in the

process of the student's educational activity. It carries new knowledge for the student and ways of mastering this knowledge and determines the structure of the thought process. The educational problem is formulated in the form of a task, task, questions. Under what conditions is a task or question a learning problem? In the presence of contradictions between knowledge and ignorance; when the content indicates the direction of the search; with sufficient background knowledge to solve the problem.

2 The initial presuppositions

In the article, the following research methods were used to solve the set tasks: theoretical (study and analysis of scientific and pedagogical, psychological and pedagogical, reference, specialized literature, regulatory documentation on the topic of research, additional professional advanced training programs; analysis, comparison, classification of the information received and generalization); empirical (pedagogical experiment, observation, questionnaire survey, survey, conversation, testing); mathematical (statistical data processing).

3 Methods

The use of problem-based learning requires certain conditions in the organization of the educational process. It is necessary to clearly understand the features of this approach and find out which part of the educational material is most suitable for studying using problem-based learning.

Teacher training, which requires a deep knowledge of their subject, new scientific concepts, approaches; a high level of education, as well as possession of a method of problem-based learning, which involves, first of all, the ability of dialogic friendly communication with students; the ability to encourage students to independent cognitive searches; attentive attitude to the thoughts, hypotheses, statements of students; ensuring the feasibility of students' work with certain problematic tasks, that is, a rational correlation of the known and the unknown.

Preparedness of students: providing motivation that can arouse interest before the content of the problem; the level of mastery of the methods of mental activity; knowledge of the actual program material.

Scientific and methodological support of the learning process to create problem situations.

Taking into account the features of a particular discipline, the topic being studied, as well as the time allotted for the program (problem-based learning requires a significant investment of time, therefore it is not often used to a certain extent).

Basic psychological conditions for the successful application of problem-based learning.

Problem situations should meet the goals of forming a knowledge system.

Be accessible to students and match their cognitive abilities.
Must cause their own cognitive activity and activity.

Tasks should be such that the student could not complete them based on existing knowledge, but sufficient for independent analysis of the problem and finding the unknown.

Thus, it can be concluded that problem-based learning has a number of advantages. It helps in the development of thinking, teaches critical and creative approach to problem solving. Of course, not all topics of the educational material can be studied with the help of this training. But the study of some issues based on problem-based learning can give positive results. It is widely used in teaching many disciplines in higher education and can be quite effective, as it makes you think and solve problems independently and creatively. Polat (2021). Awareness of the

nature of the difficulty, the lack of existing knowledge reveals ways to overcome it, consisting in the search for new knowledge, new ways of action, and the search is a component of the process of creative thinking. Without such awareness, there is no need to search, and, consequently, there is no creative thinking. Thus, not every difficulty causes a problem situation. It must be generated by the insufficiency of existing knowledge, and this insufficiency must be recognized by the students. However, not every problem situation generates a process of thinking. It does not arise, in particular, when the search for ways to resolve a problem situation is beyond the strength of students at this stage of education due to their unpreparedness for the necessary activities. It is extremely important to take this into account in order not to include in the educational process overwhelming tasks that contribute not to the development of independent thinking, but to aversion from it and a weakening of faith in one's own strength.

What task can be considered problematic, what are the signs of a problem? The symptoms of the problem are:

the generation of a problem situation (in science or in the learning process);
a certain willingness and a certain interest of the decision maker in finding a solution;
the possibility of an ambiguous solution path, which causes the presence of various search directions.

It is quite obvious that these signs are pragmatic in nature, i.e. they reflect the relationship between the task and those to whom it is offered. If this task is offered to students before they have studied this material, it is undoubtedly a problem for them, creates a problem situation for them, since their knowledge is insufficient to solve it. If this task is offered to students who already own the corresponding algorithm, then, naturally, it is not a problem for them. Iasechko, Shelukhin, Maranov (2021).

In connection with problem-based learning, two terms are usually used: "problem" and "problem task". Sometimes they are understood as synonyms, but more often the objects denoted by these terms are distinguished by volume. The problem breaks down into a sequence (or branched set) of problematic tasks. Thus, a problematic task can be considered as the simplest, particular case of a problem consisting of one task.

The algorithm of cognitive activity with a task approach is much shorter, it includes reproductive, performing activities; the student finds himself in a research position only at the stage of analyzing the condition of the problem. In professional activities, which are most often of a probabilistic nature, such procedures are rarely encountered, therefore they are purely educational in nature.

The algorithm of cognitive activity with a problematic approach is longer, and includes a task one; it is more productive in terms of the development of thinking, personal qualities; a research position is necessary at all stages, except for the stage of practical solution of the problem, and the student formulates the problem for himself.

Problem-based learning is focused on the formation and development of the ability for creative activity and the need for it, i.e. it is more intensive than "non-problem learning", it affects the development of students' creative thinking. But for this function of problem-based learning to be best implemented, it is not enough to include a random set of problems in the learning process. The system of problems should cover the main types of problems inherent in this field of knowledge, although it may not be limited to them. Iasechko, Shelukhin, Maranov (2021).

Thus, it is possible to indicate at least three main types of educational problems that approximate, liken the process of learning to the process of research.

This is, firstly, a problem that arises outside the subject (in various fields of knowledge, technology, production) or within the subject.

The second main type of problem is to study the result of solving problems of the first type.

The third main type of problems is associated with the application of new theoretical knowledge obtained as a result of solving problems of the second type in new situations that differ significantly from those in which this knowledge was acquired.
Thus, the three main types of problems perform different functions: solving problems of the first type provides new knowledge; solving problems of the second type brings this knowledge into the system; solving problems of the third type opens up new possibilities for applying this knowledge system.
Despite the obvious advantages of problem-based learning over "non-problem learning", at no stage can learning be built entirely as problem-based learning, for this it would take a lot of time. Moreover, the rediscovery of the entire program content in the learning process would lead to the impoverishment of this process (for example, in developing skills for independent work with a book, assimilation of lectures, etc.).

Therefore, there is a pedagogical problem of selecting fragments of a course of study (separate sections, topics, points) for the implementation of problem-based learning. This selection requires a logical and didactic analysis of the educational material, ascertaining the possibility of posing basic or other types of problems, their effectiveness in achieving learning goals. To a large extent, it depends on the specific working conditions.

The presentation of educational material in textbooks is rarely adapted for problem-based learning. But educational texts can be easily redesigned to carry out such learning. Harris, Sutton (1986).

Problem-based learning methods include:

A research method that assumes that students themselves, given a problem situation, will see the problem, formulate it and solve it. This is the most difficult method for students, which requires them to be active, independent, and creative.

The heuristic method is That the teacher creates a problem situation, formulates the problem himself and involves students in solving it.

Problem presentation method. Its essence is that the teacher reveals the truth of a particular science, demonstrates the standard of problematic thinking when he poses problematic questions and solves them himself.

Thus, today the technology of problem-based learning is one of the leading pedagogical technologies. It allows you to organize training, in which the teacher provides the optimal combination of their independent activities with the assimilation of new knowledge. Iasechko, Shelukhin, Maranov (2021).

At a problematic lecture, new knowledge is introduced through the problematic nature of a question, task or situation. At the same time, the process of cognition of students in cooperation and dialogue with the teacher is approaching research activity. The content of the problem is revealed by organizing the search for its solution or by summarizing and analyzing traditional and modern points of view.

The essence of the problem lecture is that the teacher at the beginning and in the course of presenting the educational material creates problem situations and involves students in their analysis. By resolving the contradictions inherent in problem situations, students can independently come to the conclusions that the teacher must report as new knowledge. At the same time, the teacher, using certain methodological methods of including students in communication, as it were, forces, "pushes" them to

find the right solution to the problem. At a problematic lecture, the student is in a socially active position, especially when it comes in the form of a lively dialogue. He expresses his position, asks questions, finds answers and presents them to the judgment of the entire audience. When the audience gets used to working in dialogic positions, the efforts of the teacher pay off a hundredfold - joint creativity begins. If a traditional lecture does not allow you to immediately establish the presence of feedback between the audience and the teacher, then dialogic forms of interaction with students allow you to control such a connection. When conducting lectures of a problematic nature, the process of cognition of students approaches search, research activities. The main task of the lecturer is not so much to convey information as to familiarize students with the objective contradictions in the development of scientific knowledge and ways to overcome them. This forms the mental activity of students, generates their cognitive activity.

In contrast to the content of an informational lecture, which is introduced by the teacher as from the very beginning known material to be memorized, in a problematic lecture, new knowledge is introduced as unknown to the students. The inclusion of students' thinking is carried out by the teacher by creating a problem situation, even before they receive all the necessary information that constitutes new knowledge for them. In traditional education, they do the opposite - first they give knowledge, a method or algorithm for solving, and then examples on which you can practice using this method. A means of controlling the thinking of students at an educational-problem dialogical lecture is a system of problematic and informational questions prepared in advance by the teacher.

4 Results and discussion

Conducting a lecture as a system of problematic and informational issues for adult students has its own characteristics. For adults who are studying after a long break (at least a few years after graduation), it is difficult to update existing knowledge. Children sometimes flaunt ignorance - after all, know-it-alls-excellent students, as a rule, are unpopular in the team. It is difficult for an adult to admit that he does not know or does not remember something. This is one of the reasons why, even having the opportunity to study full-time for financial and family reasons, the majority of people who have come out of the "student" age prefer the correspondence form of education. Therefore, before conducting a problematic lecture, the student should be able to restore their knowledge individually, using a textbook or using multimedia teaching aids, including remotely.

In a youth audience, students are not afraid to say obvious stupidity, sometimes they even do it on purpose to amuse others. An experienced teacher is able to turn this to the benefit of learning. The difficulty in conducting a problematic lecture in an adult audience lies in the fact that adults, as a rule, do not fall for a provocation and answer the question only when they know the answer for sure. In other words, adult trainees have a high level of control. The teacher must be prepared for a situation where a person who knows the exact answer (or thinks he knows) is not in the classroom. Iasechko, Kharlamov, Skrypchuk, Fadyeyeva, Gontarenko, Sviatnaia (2021).

5 Conclusion

Problem-based learning is very promising in setting and solving theoretical and practical problems, in course and diploma design. However, the surge of interest in problem-based learning in the 70s did not lead to its active use in the educational process due to the difficulty of converting the content of educational material into a problematic form, increased requirements for the teacher, and poor manufacturability.

The purpose of problem-based learning is the assimilation of not only the results of cognition, but also the very path, the process of obtaining these results (mastering the methods of cognition). It also includes the formation, development of the intellectual,

motivational, emotional and other areas of the student, the development of his individual abilities. It is an effective means of overall development of students.

The essence of problem-based learning is the systematic independent search activity of students with the assimilation of ready-made conclusions of science, and the system of teaching methods is built taking into account goal-setting and the principle of problematicity.

It is very difficult to build the entire discipline on the idea of problem-based learning. this will require a complete rethinking of the aims and content of education. The implementation of this idea requires a significant investment of the teacher's time and the degree of his skill. In addition, the effective use of problem-based learning is possible only if the trainees have the proper level of knowledge, it requires significant time periods, and does not provide means for organizing their own activities. At the same time, the need to implement the principle of problematicity as one of the main ones in any type of developmental education is generally recognized.

However, in the process of pedagogical activity, it must be remembered that "Consumption" of ready-made achievements of science cannot form a model of future real activity in the minds of students.

The authors of the problematic method attach exceptional importance to replacing the strategy "from knowledge to the problem" with the strategy "from problem to knowledge".

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