

The Use of Problem Training Technology at Biology Lessons for the Purpose a Personally - Oriented Approach Development

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Abstract

The use of the problem approach during the lessons of biology makes it possible to intensify the intellectual and cognitive activity of students, to direct their cognitive process to the trend necessary for a pedagogue, and to focus on key aspects. Such an approach in a lesson conduct excludes the possibility of only mechanical memorizing for material, prompts interest in the explanation of unknown essence, and this entails the process of new knowledge assimilation and the development of logical thinking. A student does not become just an end user of ready knowledge, but he is an active participant in their search. Also, an undisputed advantage of problematic learning is the frequent use of group search method for problem solution during a discussion. In the course of this schoolchildren acquire and develop skills of team work, the formulation of a thought, the protection of their point of view with the proving of its correctness. The problem method allows to achieve more productive mental activity during lessons, therefore its elements are applied in modern pedagogical practice.

Key words: Problem approach, biology, Personality-oriented approach, Educational problem, Problem situation, Problem dialogue technology, Problem presentation method, Pedagogical skills

INTRODUCTION

The concept of “modern lesson” today is the topic and subject of both scientific and public discussions. The society, rising on the stages of its development, makes new demands both for education in general and for a specific lesson in particular. The goals and the content of education, the requirements for results change, new technical means and technologies of teaching emerge, and a lesson remains the main didactic unit of the educational process and continues to ensure the development of those graduate qualities that meet the requirements of modern society [9,15,16]. Therefore, one of the primary general educational and upbringing tasks of a school is the development of problematic activity culture for students.

The relevance of this work is to consider the method of problem training as an effective factor that stimulates educational process, increases the activity of students, contributes to the development of a goal to overcome the difficulties in the process of cognition, as well as to the development of creative thinking and creative abilities.

The purpose of the study: the consideration of the problem approach application in the teaching of biology, the proof of problem training advantages before the traditional one.

Biology is one of those academic disciplines of knowledge from the area that will be useful outside of school. Biology gives the idea of the surrounding world, the phenomena taking place in living nature and their relationship [13].

The indicator of a high level of pedagogical skill is the activation of the thinking process. The more active cognitive activity, the more productive its results.

Problem training is one of the ways to activate the learning process. The structural unit of this type of learning is a problem situation that is created by a teacher through problematic tasks, objectives and questions [1,6,12].

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METHODS

Theoretical and empirical methods were used for this article: study, the analysis of domestic, foreign scientific, methodological literature and pedagogical experience, as well as observation, testing, questioning, ascertaining and developing pedagogical experiment, interview and conversation.

RESULTS

Nevertheless, most methodologists agree on the need to use problem education during biology lessons. The feature of a teacher's methodical preparation is that pedagogical technologies are not only the object of study, but also the means of teaching. Thus, a teacher is immersed in this or that technology as a student during the advanced training courses. The organization of pedagogical reflection allows to understand the essence of technology [9].

The number of teachers who mastered the methodology of problem education increases (the method of problem dialogue became widespread especially), and the number of schools using this methodology as the main one also increases. The development of textbooks based on the principles of problem-based learning is carried out, which greatly facilitates a teacher's task of preparation for a lesson. The elements of problem training make it possible to create the atmosphere of interest during a lesson. So, for example, during the study of the section "Man" problematic problems make it possible to create the atmosphere of interest from monotonous lectures and the banal learning of material. Students are asked to compare the structure of a man and an amoeba. Students note that the structure of man tissues has a cellular structure, like the body of an amoeba [4].

One of the examples of problematic tasks will be to trace the dependence of ear, eye, and tongue structural features, depending on the function performed during the study of the topic "Sense organs". Students note that each organ has a unique structure, strictly dependent on the function performed, and that one sense organ can not take on the functions of the other.

A problem element can be integrated into any part of a lesson.

At the beginning of a lesson, a problem situation is created through a clash of opinions, one half of a class proves the statement "We eat in order to live", the second defends its point of view under the slogan "We live in order to eat". In the middle of a lesson, students are invited to split into

the supporters of the theory that you eat when you want and supporters of meal regime observation.

The lessons built with the use of a problematic methodology eliminate psychological tension during a class, involve more students in the discussion of a problem than traditional methods. The atmosphere of creativity [5] prevails during such lessons.

The problem issue used during a lesson should not imply a ready answer already present in the minds of schoolchildren, the answer to this question does not require any mental effort [8]. But a student's knowledge also must contain the initial data necessary for a solution. They will become the basis of creative search, for example:

- Why did the number of herbivores increase sharply at first, and why did their number decrease dramatically after the destruction of predators in the forest?
- The geographer Humboldt said: "forests precede a man and accompanied by deserts". Is the traveler right?
- In 1967 Christian Barnard, as a young expert in the field of surgery, performed a heart transplant operation with great skill. The sterility conditions were met. Why did the recipient die?

Among the methods of problem training implementation during a biology lesson, teachers use the method of problematic exposition, heuristic conversation and the method of research assignments. These three methods are used to create problem situations during a biology lesson (Figure 1).

The technology of a problem dialogue or heuristic conversation has become widespread among teachers just recently. This technology allows you to teach children to learn independently. A teacher gets the role of a "compass", he uses a dialogue to indicate the direction of thought movement. Such lessons are interesting not only to students, but also to a teacher. Creativity during problem lessons is the driving force of a child's development. In the process of a problem dialogue, a student passes through all the links of a scientific discovery - as a scientist who encounters a contradiction, asks himself a question - this is

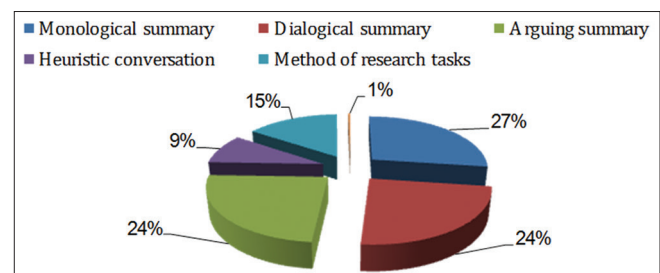


Figure 1: Frequency of problem training methods use at biology lessons in average link classes

the stage of posing a problem. By brainstorming, thinking he comes to hypotheses and their verification and he finds a solution [4].

Heuristic conversation is a highly productive way of knowing. The problem situation modeled by a teacher becomes the foundation of a problematic dialogue. One can create a problem situation during a lesson using the element of surprise (the Right lung contains more air than the left one), inconsistency (food proteins are absorbed by a body, and the donor tissues can be rejected, why?), comparison (What features of the structure can be noted among the plants of arid places if we compare it with a plant growing in a climate of medium latitudes), conflict (Botanists argue that euglena green is a plant, zoologists consider it as an animal), generalization, the establishment of intersubject connections (What provides the flow of blood in one direction?) [6].

During the lessons of biology it is permissible to use the method of problematic presentation, which does not give a high level of independence in the course of the educational process. It is advisable to use it in those cases when the amount of new information to be learned is too great, or when students do not have enough knowledge to cope with an educational problem on their own [10].

Also the method of research assignments is suitable for use in biology lessons. The practical activity of students is possible only if there is sufficient theoretical knowledge of schoolchildren. Such method of problem training has the highest score on the scale of knowledge effectiveness. This method is realized through laboratory, practical exercises, excursions, experiments and problem solution. The main distinguishing feature is their independent fulfillment [7, 11]. The topics that can be used for research work of schoolchildren are presented below:

- Household waste. How to save a city from pollution.
- Identification of foot arch changes among the students of junior and senior school age.
- The features of nutrition and the regime of a child's day with the diagnosis of diabetes type 1.
- The influence of presowing treatment methods on the germination of seeds.
- Biosynoptics (They study the behavior of plants and animals, predicting weather phenomena).

Research tasks on the following topics are often used within a lesson:

- The study of frog and human blood products.
- The study of saliva enzyme impact on starch.
- The identification of organic substances.
- The study of plant cell structural features.
- The study of respiratory processes among plants.

Not even the most detailed teacher's story or a textbook text will replace the things a child sees himself in the course of independently carried out research work, which entails the mastery of knowledge and skills [3].

DISCUSSION

The experiment was conducted at the MBGEI "School № 171 with in-depth study of individual subjects" of Soviet district of Kazan.

The experiment involved the students of 5A and 5B grades. 5A grade has 29 people, 5B - 30. Student were questioning to determine "the attitude to the subject of biology" using the method developed by L. Balabkina (Table 1) [2].

The questionnaire before the experiment showed that at least half of the students are indifferent to the subject in selected grades (in 5A - 55%, in 5B - 50%), that is, they are not interested in knowledge and are not involved in the active process of cognition and thus an extremely low motivation to learn (Figures 2 and 3).

The repeated questioning was carried out after the integration of problem training methods into the educational process. The quantitative indicators are reflected in Table 2 and on Figures 4 and 5.

The attitude to the subject of biology in the 5A grade, where the education continued traditionally was slightly different from the baseline one. The general tendency of low interest in knowledge preserved among school children.

Table 1: Summary table of the first questionnaire results "Attitudes to the subject of biology" in 5A and 5B grades

Attitude to the subject	5A	5B
Extremely negative	1	0
Negative	5	2
Indifferent	14	17
Positive	6	7
Actively positive	3	4

Table 2: Summary table of the second questionnaire results among 5A and 5B grades

Attitude to the subject	5A	5B
Extremely negative	1	0
Negative	6	0
Indifferent	15	7
Positive	4	16
Actively positive	3	7

In the second experimental grade, where the problem training was actively used during biology lessons, the questionnaire conducted repeatedly revealed the increase in the general educational motivation of the grade. There was the decrease in the number of students who had a negative and indifferent attitude to discipline, the number of students with extremely negative attitudes toward biology fell to zero (Figure 5).

Figure 6 makes it clear that the class where training was conducted in a traditional way had no substantial increase in the general level of interest to the subject, but there was some decrease in the number of students positively related to the subject.

In 5B grade the use of problem-based learning methods at biology classes led to the significant increase in the number of students positively and actively-positively related to the subject (Figure 7).

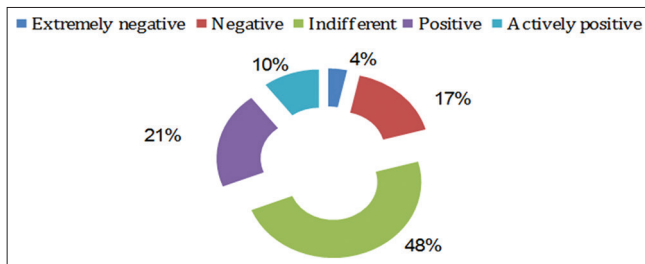


Figure 2: Relation to biology among 5A class pupils prior to the experiment

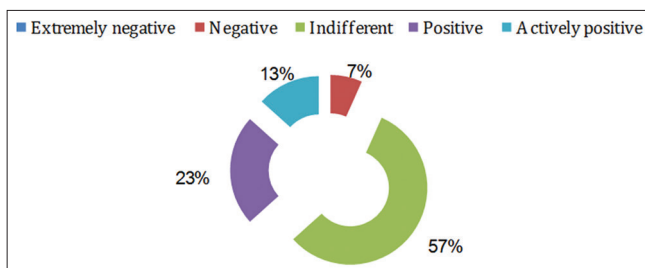


Figure 3: Relation to biology among 5B class pupils prior to the experiment

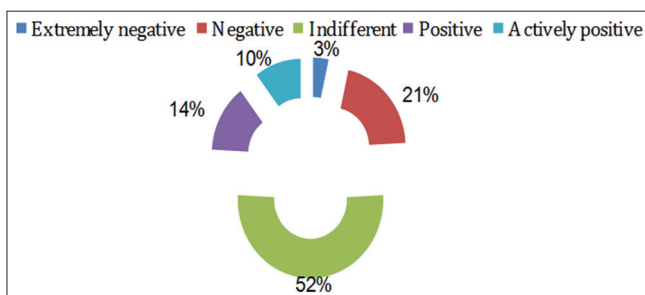


Figure 4: Relation to biology among 5A class pupils after to the experiment

The comparison of the first and the second questionnaire indicators shows that the methodology of problem training contributed to the increase of the positive attitude to the studied subject at the 5 B grade by 44%, with the traditional education this value decreased by 7%, which is clearly reflected in Table 3.

The methods of problem training are more effective for student involving in the education process and the quality of education improvement [14].

Then we applied the technique by E.P. Ilyin and N.A. Kurdyukova, which allows you to determine the level of focus on student knowledge acquiring [2].

According to the results of the first survey at 5A grade, the greatest result was 8 points (out of possible 12) among 3% of students. 7% of students have the level of orientation on knowledge acquisition equal to 0,1,2 and 6 points, 21% of fifth graders scored 3 points, 31% - 4 points and 17% - 5 points (Figure 8).

5 B grade had the following ratio of scores: 7% - the level of focus is 0 points, 10% the level of focus equal to 1,2,5

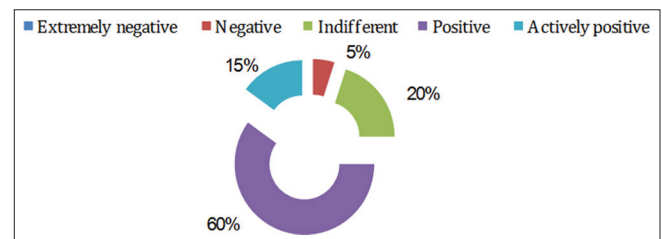


Figure 5: Relation to biology among 5B grade pupils after the experiment

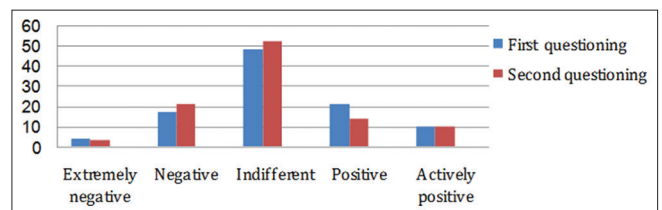


Figure 6: Comparison of indicators from the first and second questioning in 5A grade

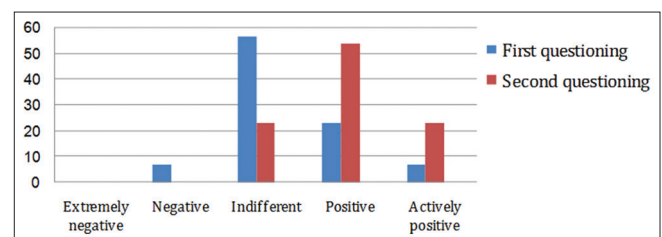


Figure 7: Comparison of first and second questioning indicators in 5B grade

Table 3: Summary table of the questionnaire results

Attitude to the subject	5A		5B	
	Prior to the experiment	After the experiment	Prior to the experiment	After the experiment
Extremely negative	1	1	0	0
Negative	5	6	2	0
Indifferent	14	15	17	7
Positive	6	4	7	16
Actively positive	3	3	4	7

points, 4 points among 37% of respondents, 6 and 7 points among 3%, 3 points among 20% (Figure 9).

According to the results of the second survey, 21% of the students at the 5A grade scored 2, 3, 4 points, 10% - 1 point, 7% - 0 points, 3% - 7 and 8 points (Figure 10).

In 5B the analysis of the second test results gave the following results: 7% of the children did not score any points, the number of those who scored 4 points is 27%, and the number of those who scored 5 points is 28%. Among 14% of sixth graders, the focus on knowledge was assessed at 3 points, 21% - at 6 points, and 3% are those who scored 7 and 8 points (Figure 11).

Comparing the results of the first and second questionnaires of the experimental and control classes assessing the degree of focus on knowledge obtaining, we recorded the increase in the number of children at 5B grade with a high level of motivation to knowledge (Figures 12 and 13).

The use of the methods and the technology of problem training at biology lessons contributed to the increase in the level of focus on the acquisition of knowledge among the 5 B grade students.

CONCLUSIONS

Each teacher wants students to try to learn something new during his lessons, they were involved in the work process during a lesson, and were not just in a classroom. But, unfortunately, most teachers believe that interest in education is the phenomenon that comes with age. The desire to learn will appear after an endless solution of the same type of tasks, the learning of texts from a textbook. Such judgments are far from truth. The memorization and the uniformity of material presentation during lessons does not stimulate the craving for knowledge, but, on the contrary, moves it towards zero.

Cognitive discoveries can not be based only on reproductive activity. The way out of this situation lies through the technology of problem training. The methodology of problem training allows us to move from the process of

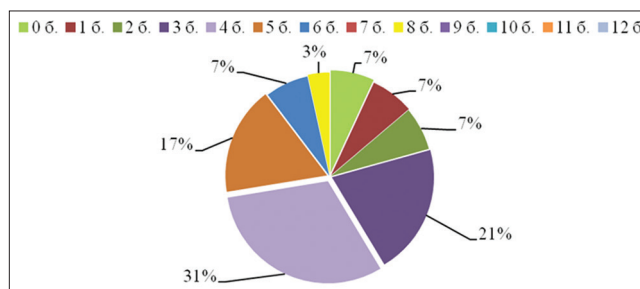


Figure 8: Orientation level on acquisition of knowledge at 5A grade by the results of the first poll

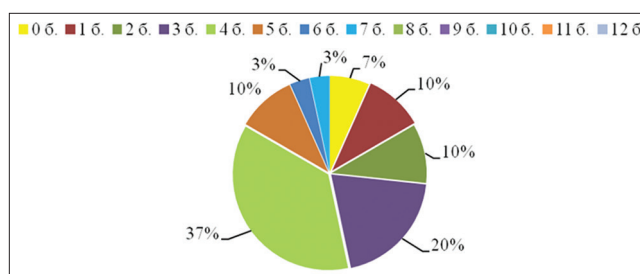


Figure 9: Orientation level on acquisition of knowledge at 5B grade according to the results of the first poll

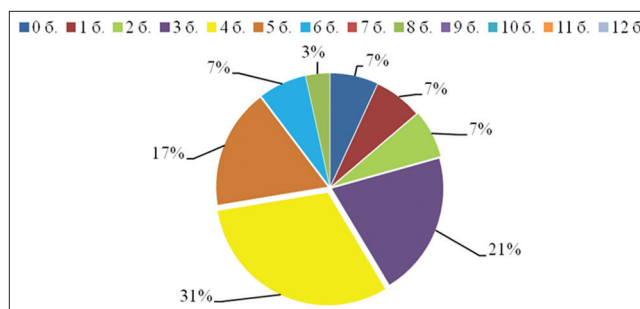


Figure 10: Orientation level on the acquisition of knowledge at 5A grade by the results of the second poll

memorization to the process of fascinating cognition. The problem approach at the lessons of biology makes it possible to increase the overall level of student progress, to achieve the growth of internal motivation indicators, to instill some love for a subject, the desire to receive knowledge, and not only positive assessments and a teacher's praise.

The results of the experiment show that the grade in which the lessons of biology passed in accordance with

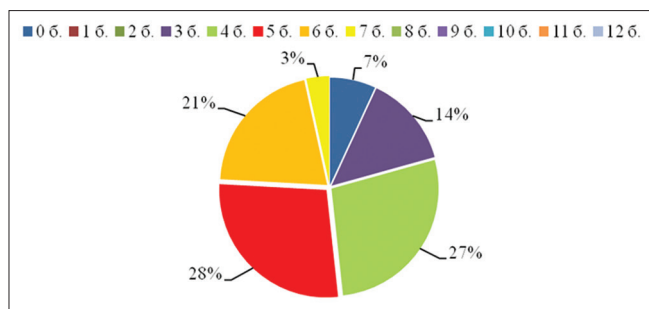


Figure 11: Orientation level on the acquisition of knowledge at 5B grade according to the results of the second poll

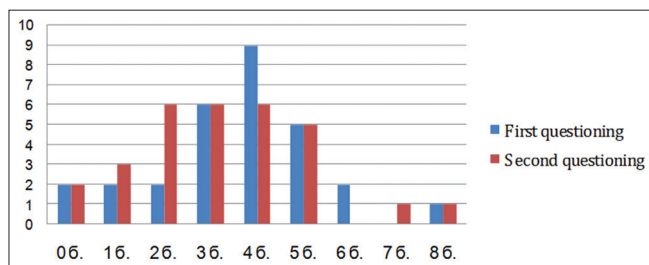


Figure 12: Comparison of indicators of the first and second questioning at 5A grade

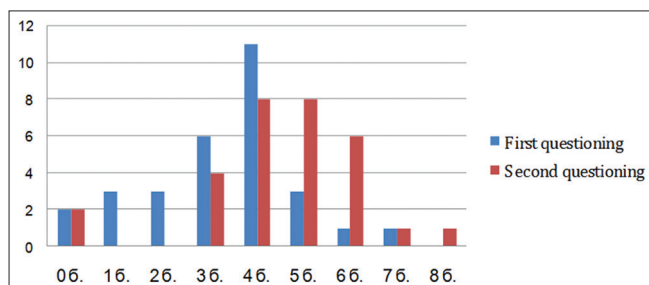


Figure 13: Comparison of indicators of the first and second questioning at 5B grade

the method of problem training demonstrated more solid learning outcomes at the end of the experiment than the fifth-graders who studied biology in the traditional way. 5B students showed an interest in biology, the need for self-education and self-developent appeared. Besides, the overall performance of the grade increased.

This indicates a greater productivity of this technique in comparison with traditional learning. And it makes possible

to point out the problem training with the title “advanced learning technology”.

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