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LABORATORY WORK AS A METHOD OF IMPROVING THE QUALITY OF TEACHING BIOLOGY

R.Z. BAYZHANOVA

Astana International University, Nur-Sultan, Kazakhstan

Аңдатпа. Бұл мақалада зертханалық әдістерді оқытудың сапасын жақсарту әдісі ретінде зертханалық әдістерді тиімді пайдалану стратегиясы және жаратылыстану ғылымында зертханалық жұмысты қолдану кезінде туындайтын проблемалар туралы баяндалады. Бұл жұмыстың мәні - мектеп тәжірибесінде биология сабақтарында зертханалық жұмысты қолданудың әдіснамалық аспектілерін анықтау. Мақаланың мақсаты биологиялық білім туралы білімді жетілдіру, студенттерге биологиялық объектілерді дербес тереңдетіп меңгеру дағдыларын үйрету, сондай-ақ осы білімді тәжірибеде қолдану болып табылады.

Түйінді сөздер: зертхана; зертханалық жұмыс, практикалық сабақтар, мектепте оқыту әдістері; бағытталған зерттеу әдістері.

Аннотация. В данной статье рассматривается использование лабораторных методов как метода повышения качества образования, кроме того, излагаются стратегии эффективного использования лабораторных методик и проблемы, возникающие при использовании лабораторных работ в преподавании естествознания. Суть данной работы заключается в определении методологических аспектов использования лабораторных работ на уроках биологии в школьной практике.

Целью статьи является совершенствование знаний о биологических знаниях, обучение студентов навыкам самостоятельного углубленного изучения биологических объектов, а также использованию полученных знаний на практике.

Ключевые слова: лаборатория; лабораторные работы, практические занятия, методы обучения в школе; методы направленного обследования.

Annotation. This article discusses the use of laboratory methods as a method of improving the quality of education, in addition, outlines strategies for the effective use of laboratory techniques and the problems that arise when using laboratory work in the teaching of natural science. The essence of this work is to determine the methodological aspects of the use of laboratory work in biology lessons in school practice.[1].

The purpose of the article is to improve knowledge of biological knowledge, teaching students the skills of self-depth study of biological objects, as well as the use of the knowledge gained in practice.

Key words: laboratory; laboratory work, practical work, teaching methods at school; directional survey methods.

Laboratory work is an organic part of the educational process. Their content is directly related to other types of school study experiment, teacher’s demonstration experiments and home experimental tasks, problem solving with the use of observations and experiments. Laboratory work contributes to the implementation of communication theory and practice of the unity of thinkers and practical activities of students [1].

A laboratory work reveals to the students one of the basic methods of research in the natural sciences - the experimental method (observation, play and study of the phenomena and processes of measurement and processing of the results, conclusions). In this form of study, the role of experiment as a source of knowledge and the criterion of the truth of a theory is most fully clarified.

Laboratory work helps students form materialistic views on nature, beliefs in its knowability, in the presence of cause-and-effect relationships in nature (various properties of matter-matter, their structure, dependence of properties on structure are studied, connections between phenomena are examined, functional dependencies between biological organisms) [2].

Scientific information is acquired by students in the process of laboratory work with the participation of a large number of different analyzers. Synthesis of indicators of various analyzers clarifies perception, accelerates the processes of formation of scientific concepts. Analyzers

themselves are being improved, especially the skin motor. All this ultimately contributes to the development of students' thinking.

Laboratory work contributes to a deeper understanding of the nature of the phenomena and processes being studied. Laboratory work on the content are divided into the following types: familiarizing students with the facts, properties of substances (the presence of the plant cell structure - botany), the study of phenomena and processes (plant respiration - botany), checking patterns (dependence of plant development on light, temperature, nutrient composition - botany), the principle of operation and characteristics of the device and technical installations - assembly of the microscope).[3].

Thus, the order of society and the humanistic theory of education characterize the development of research skills in the process of teaching biology as an important task of modern education N.M. Verzilin notes that the skills associated with biological knowledge are determined by special concepts. The author has proposed the following classification into groups: morphological skills - the definition of the form of organs; systematic skills - comparison and definition of plants and animals; anatomical skills - working with a magnifying glass, microscope, preparation of drugs; physiological skills - observation of life processes, setting up an experiment. Thus, the author identifies for each course of biology naturalistic skills associated with concepts that have a certain character.[4].[5].

In this regard, the issue of the scientific validity and experimental confirmation of the feasibility of using a laboratory workshop with the aim of improving the quality of student learning becomes relevant.

This work was carried out by me in the 2018-2019 school year in the “Secondary school № 45 "” of the city of Nur-Sultan. The study involved two classes: an experimental class (EC) - 7 "c", consisting of 21 students and a control class (CC) - 7 "b", consisting of 19 students. As part of the research, the following criteria were measured: (cognitive, operational, and motivational) and parameters for evaluating the effectiveness of training in the conditions provided. The cognitive (knowledge) criterion was determined with the help of testing, the operational one was determined with the successful implementation of practical calculations, and the motivational one with the help of questioning.

The results obtained should be systematized in order to identify levels of academic performance, practical skills and motivation to teach students.

The results were ordered into a five-point scale of 3 levels (I , II , III) and the dynamics of their change was tracked.

The control class (CC) performed laboratory work in the traditional way. When carrying out laboratory work with the traditional method of ready-made instructions, a low level of cognitive

activity was observed. Indeed, in fact, the instruction for carrying out laboratory work is an algorithm that will necessarily lead the performer to the final result, provided that each element is executed correctly. This lesson begins with an introductory conversation, during which the topic, purpose, and content of the work are determined: the teacher gives the students assignments (usually assignments are given in writing, on cards, one assignment on the student desk).At the end of the lesson the results of the work are discussed, conclusions are made. Thus, the traditional method considers a combination of dogmatic and explanatory types of training. “There are numerous evidences of this,” writes N.N.Skatkin, - the type of educational process that dominates in our country, contributed to and largely continues to contribute to the preparation of passive performers. This type of training has come into sharp contradiction with the needs of social development. ”[6].

During the ascertaining stage of the study, it was revealed that 86% of the students coped with the testing, of which only 34% of the students scored 100-80 points, respectively, more than half showed a low level of knowledge. The practical part of the task could not be completed by 18% of students from the total number of students. In addition, I would like to note that at the recital stage, 20% of the students had a low level of motivation. At the same time, the results of the study during the school year, the performance in the control class (CC) remained at the same level, with minor positive changes. Estimates for laboratory work are taken into account in the final assessment of the performance of students in the traditional biology teaching system (9-11 grades), when learning the updated training system (grades 5-8), the evaluation of laboratory work in biology and natural science is not provided, which is the lack motivating factors in students in carrying out laboratory work.

Laboratory lessons do not have a search character, since laboratory lessons of an illustrative plan prevail in school practice. A study conducted during the ascertaining phase revealed a number of problems and shortcomings of traditional laboratory work. According to the results, it is clear that students in the control class (CC) showed an average level of performance. This was especially evident when measuring the motivational criterion. The disadvantages of this type of training include: relatively high activity of a teacher and low activity of students; the complexity of managing the cognitive process in the learning process.

It is known that learning is a two-way process. This is the unity of teaching and learning. Human development occurs as a result of our own activities, and, therefore, is the basis of learning. The main role of the teacher is not so much in providing the student with new information so that he can successfully conduct the experiment, but in the proper organization of the educational process and in managing the cognitive activity of the student.

Despite the transformations in the field of biological education, the student's out-of-school activity weakens, which undoubtedly leads to a decrease in the level of education, and the methods and means of developing research skills that take into account modern demand are not reflected in the methodology of teaching biology .

Therefore, in order to activate the cognitive activity of students in the next stage, the Experimental class (EC) did the same work as the control class (CC), but they were given homework, followed by collective discussion in the class, it was proposed to independently develop the stages of laboratory work, the algorithm of the work, to determine the purpose of the laboratory work, to make tasks with handouts, with measures to ensure compliance with safety regulations, with detailed instructionsyou with sources of electric current, heaters, glassware and so on, will get acquainted with various biological objects and their properties with varieties.

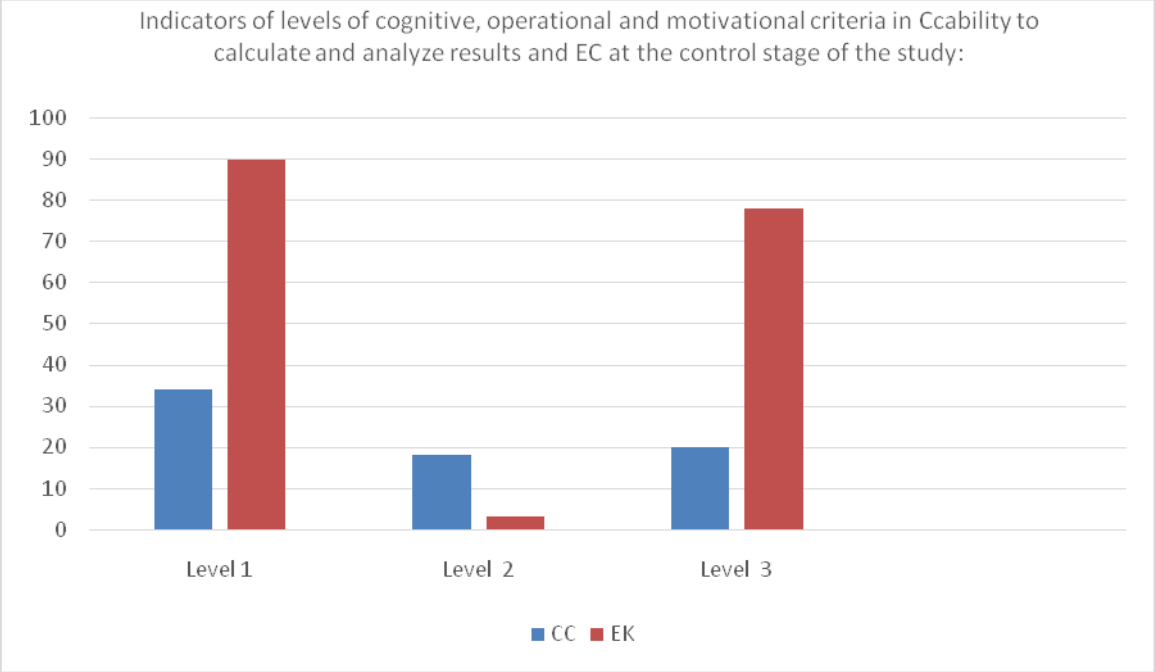

Figure 1.

The results of the diagnostic work at the control stage of the study showed that the experimental class (EC) value of high-level criterion indicators exceed the value of low and medium levels.Such dynamics can be traced by all criteria.For example,the survey showed that the majority of students in the experimental class (EC) have a positive attitude towards independent work - 78%.Only one student (3%) in the classroom did not cope with the practical task.Analysis of the research showed that students improved the quality of knowledge on the topic under consideration, the number of students who received an unsatisfactory grade decreased by 5%, a positive rating by 23%.The number of students who did not cope with the task decreased by

10%.There was also a sharp increase in student motivation and activity. A positive attitude towards self-study and laboratory work has increased 5 times.

According to the results of the study in the experimental class (EC) during the school year, as students gain experience for laboratory work, the level of cognitive activity of students increased: devices, materials and other equipment are selected from the available classroom (for example, microscopes with the necessary magnification, independently prepare preparations for studying under a microscope). Students independently make measurements and calculations, process them, which corresponds to the research principle of learning. In addition, the trainees independently put forward a hypothesis and look for its confirmation with the technical means and materials provided to them.

On the basis of many years of experience, I consider the sketching of the objects studied as a necessary element of learning. The ability to correctly draw an object constitutes the method of scientific research and at the same time reflects the degree of assimilation of the material. Therefore, this aspect is a priority in the analysis of the results of learning the material. Children's research skills mature in learning activities that are analogous to research activities; creative abilities do not replace the knowledge and skills of students, but they guarantee their acquisition, consolidation and use in practice.[7].

Formation of students 'skills in biology lessons, increasing the requirements for preparing students means developing students' stable knowledge, expanding the scientific outlook. Now the main task of education is becoming its focus on acquiring its own valuable experience. When conducting a study of the dynamics of the level of development of research abilities in students of 7th grade.

Some authors distinguish the operational component of students' research activity during laboratory work, which includes 3 groups of coordinated skills that make up the structure of research activities: special, intellectual, subject (biological).These include the ability to establish connections of the phenomenon under study with others, the ability to explain, the ability to draw practical conclusions, the ability to analyze, compare, summarize, identify cause-effect relationships and so on.During the study, the quality of laboratory work was checked on the basis of the teacher's observations on the educational work of each student.

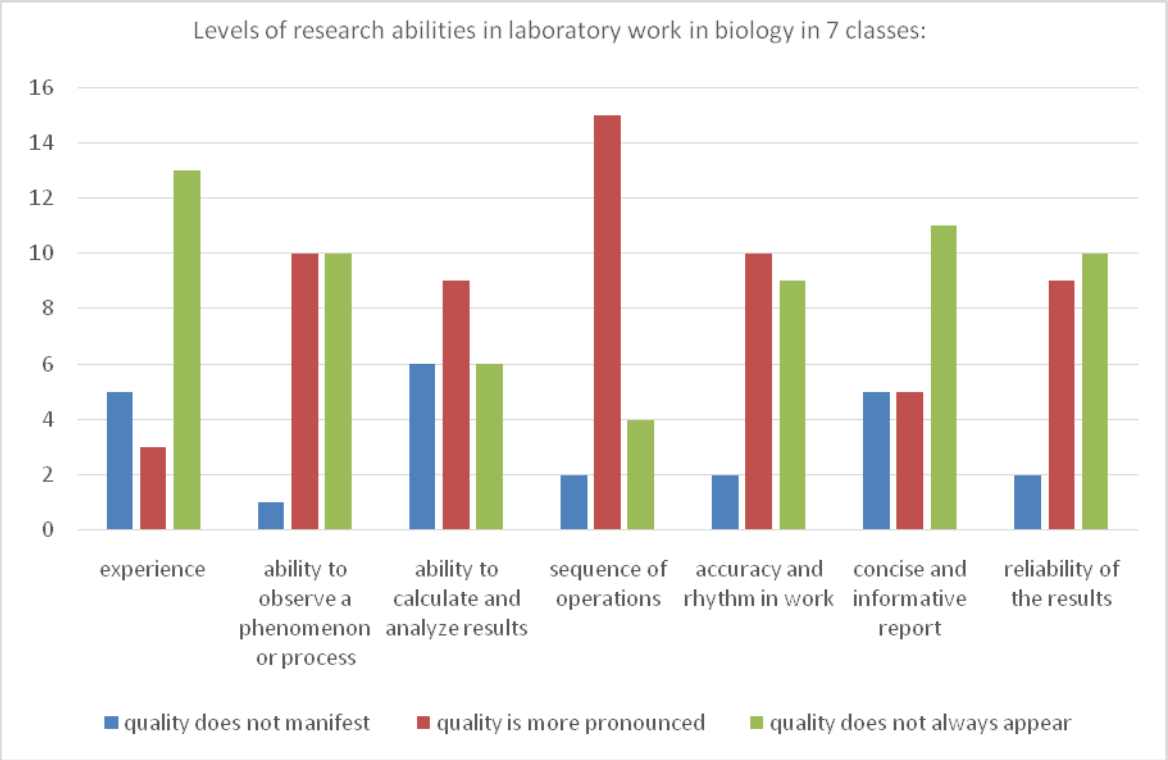

Figure 2

According to the analysis of the research results (Fig.2), the increase in the level of academic performance and the quality of knowledge among pupils of 7th grade in biology during laboratory work in the 2018-2019 academic year there is an improvement in the quality of education in comparison with the same period of the last academic year (from 52.3% to 68%). High achievement results were achieved as a result of the use of effective technologies in teaching biology, creating conditions for increasing motivation.

For the development of cognitive competence in biology lessons, after studying algorithms in standard circumstances, students on the basis of recommended predetermined algorithms are invited to solve a creative problem or propose a new, unusual solution to the problem.

It is the understanding of the internal structural organization that should form a non-standard thinking, different from a narrow circle of ideas. Updating, scientific equipment of the content of educational material in recent times is also carried out at the expense of electives on the subject of biology, whose task is to in-depth consideration of individual issues and problems, updating interdisciplinary connections, familiarizing students with research activities, developing interests, aptitudes, abilities of schoolchildren, their creative potential.[8].

The theoretical analysis of the problem showed that:

1. Laboratory work is a necessary and necessary element in the study of the course of Biology;

2. Laboratory work allows to consolidate theoretical material and improve practical skills;

3. Laboratory work contributes to the development of educational skills: analyze, compare, compare, evaluate, make conclusions, express their own opinions and justify it, collapse information, present the results of work in various forms / conclusions, theses, logic circuits, tables.

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БИОЛОГИЯ САБАҚТАРЫНДА АҚПАРАТТЫҚ ТЕХНОЛОГИЯЛАРДЫ ҚОЛДАНУДЫҢ ТИІМДІЛІГІ

СЫРЫМБЕТОВ С.Т.

Қ.Жұбанов атындағы Ақтөбе өңірлік мемлекеттік университеті, Ақтөбе қаласы, Қазақстан

Аннотация. В статье рассмаатриваются методики использования информационных технологий на уроках биологии. Использование информационных технологий на уроках биологии,дает возможность продемонстрировать разнообразие материалов, эффективное тестирование на основе знаний, формы организации работы и мультимедийные модели, чтобы сформировать полную картину биологического процесса в умах студентов. В этой статье отмечается,, необходимость уметь грамотно использовать компьютерные и телекоммуникационные инструменты и что они могут иметь огромное количество визуальной информации, которая представляет интерес для учащихся по предмету. Использование информационных технологии на лабораторных занятиях дает возможность показывать микропрепараты на экране и знакомят с