DEVELOPMENT OF RESEARCH SKILLS WHEN TEACHING BIOLOGY TO STUDENTS USING VIRTUAL PROGRAMS

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Annotation: *This study focuses on the effectiveness of using virtual programs in the process of teaching biology to develop research skills in students. In the rapidly evolving educational environment, virtual tools represent a potentially powerful means of creating interactive and profound educational experiences. The study includes conducting experimental teaching, where the experimental group of students uses virtual programs, while the control group relies on traditional teaching methods. The results of the comparative analysis allow for identifying the impact of virtual programs on the effectiveness of developing research skills. Through the analysis of data collected using standardized instruments and assessment metrics, the study highlights the advantages and limitations of integrating virtual programs into biology education. The results lead to conclusions about the importance of incorporating modern technologies into the educational process for the development of key research skills among students. This research provides valuable practical recommendations for biology teachers and educational researchers interested in modern approaches to teaching and developing research skills in students.*

Key words: *Biology Education, Research Skills, Virtual Programs, Educational Technology, Interactive Learning, Student Engagement, Experimental Teaching, Pedagogical Tools, Modern Teaching Methods, Educational Effectiveness, Virtual Laboratories, Digital Learning Resources.*

An important role in the organization of the educational process is played by the interactivity of the training program, as well as the forms and methods of presenting educational information. The organization of training must take into account the psychological characteristics of students. Students with a preference for a visual - figurative type of memory and an artistic way of thinking prefer active forms of learning with a playful approach to presenting material. Those who have a thinking type of memory are more suitable for working independently with educational material, performing analytical tasks, and training skills using virtual training programs [1,2].

Independent learning activities play a role in assessing the effectiveness of the educational process and can affect various aspects of educational work. It influences the formula of the problem, the stability and consolidation of new scientific knowledge, as well as self-control.

A student receives true knowledge only when he assimilates it independently, without assistance. When working with the educational system, the student himself chooses the pace, complexity and volume of tasks. Therefore, the teacher, taking this into account, approaches the lesson more carefully and plans high-level activities. Using the same methods and tools can affect the effectiveness of learning and reveals a loss of interest [3,4]G.I. Golobokova. “System of independent work of students in the conditions of

modern education." // Innovative technologies in technology and education. – 2015. – P. 148 – 155..

The scientific organization is aimed at accelerating the pace of decision-making. These conditions can be distinguished in five main areas [5].

The first direction is related to student management, which can be developed either with the use of technical means or by a teacher. Pedagogical management of students' cognitive activity includes observation, control and correction of erroneous perceptions. In this form of organization, management is carried out on the basis of the final result achieved over the course of the training period. However, the disadvantage of such a case is the possibility of missing knowledge gaps due to the delay in identification and limited time for correction [6,7].

When managing the educational process using technical means, correction of the student's activities is carried out after each stage of training. In such an individual form, the characteristics of each student or subordinate are considered and the group averaging of individuality occurs. An approach that takes into account the student's characteristics is called directed; in a group form of learning, it is called scattered.

Thus, the scientific organization of the educational process includes various forms of managing students' activities, taking into account the final result, which is characteristic of each student.

The second direction is related to planning the educational process, taking into account psychological and pedagogical classes . When drawing up final programs and didactic tools, it is necessary to comply with the following requirements: 1. Creation of an emotional lesson that can arouse interest in learning and the need for knowledge. 2. The optimal pace and rhythm of the lesson, at which the teacher's action is completed successfully. 3. Ensuring full contact between the teacher and students in the lesson, with the participation of pedagogical tact and optimism. 4. Creating an atmosphere of goodwill and active creative work. 5. The active participation of each student in retaining knowledge, which is observed by the teacher. 6. Taking into account such hygienic requirements for the office as temperature conditions, lighting, air quality, etc. 7. Preventing fatigue from sequential alternation of activities.

Thus, the next direction of the scientific organization of the educational process is planning, which includes psychological and pedagogical principles and compliance with the requirements for emotionality, a wide pace and rhythm of the lesson, active learning by students and other aspects that contribute to effective learning [8].

The third direction includes active forms and methods of learning. This means that learning occurs in such a way that students actively acquire scientific knowledge and can apply it in practice.

With the use of computer technology and the creative thinking of a teacher, a modern lesson can become effective for every student. In a group of students, groups can be divided depending on the level of perception (strong, medium and emotional). When planning a lesson, it is necessary to take into account the minimum level of knowledge for each group of students, thus, differentiated instruction can be more effective. In some cases, the teacher

may be temporarily replaced for the majority of students after initial instruction, which will restore the teacher's computer time to work on higher priority or student assignments [9].

As a result of the effective use of time in the lesson, students actively move towards achieving their ultimate learning goals. Achieving activity and awareness in learning can be achieved in the following ways:

- General interests of students and their development of cognitive motives and professional inclinations.
- By creating problem situations in the lesson and organizing the process of solving them.
- Using forms of learning such as computer games, conferences using or accessing the Internet.
- Designation of various forms of teamwork.

The fourth direction is to determine the place of the virtual program and didactic tools in the lesson. First, it is necessary to determine the place of the computer in the educational process. When surveyed, the majority of teachers and students (more than 90%) answer negatively to the question: "Can a computer replace a teacher in the classroom?"

The responses indicate that students take the survey questions seriously and have an adequate appreciation of biology as a life science. The human factor and personal interaction are considered as necessary conditions for the successful mastery of educational material. The role of the teacher in the educational process. Question: can a computer replace a teacher in a lesson? Answers in (%):

Teachers: yes – 2%, no – 98% . Students: yes – 6%, no – 94% .

Students justified their answers, pointing out that "nothing can replace live communication" and that "live communication and discussion are important, and not just the presentation of educational material." They believe that the computer does not direct this aspect.

To the question of the questionnaire: "What lessons have computer technologies been used in the study of biology?", teachers gave the following answers in (%):

Knowledge control is a huge percentage of choice.

Working with software knowledge control - only 10% of teachers perform such tasks in the form of tests, the rest encounter them only in individual cases.

Many teachers use special programs and didactic tools for various areas of preparing and conducting lessons. They are used to explain and reinforce the material being studied in 85% of cases, for modeling - in 80%, for conducting a computer experiment - in 75%.

This showed that the teaching of medical biology, where models are often encountered and experiments are carried out using a computer, to clearly and objectively show the life processes in biological resources [10,11].

The computer allows for the possibility of various learning tools at a higher and higher quality level. When designing a teacher's lesson, it begins with what role the Republican computer program will play as a teaching tool, and also uses various methods to achieve results in accordance with the goals of the lesson [12,13].

In universities it is not always possible to talk about owning computer equipment due to limitations in technical equipment. Therefore, the term “computer lesson support” is often used. Computer support is complex software that is often encountered in the classroom.

Based on the results of the research work, we propose to use virtual programs and didactic tools at various stages of the lesson:

a) Learning new material: in 85% of cases, computer technology is used to explain new educational material.

b) Knowledge control: in 92% of cases, computer technologies were used to control classes.

c) Modeling of biological processes: in 80% of cases, computer technologies are used to create models and biological processes.

d) Conducting a computer experiment: in 75% of cases, computer technologies were used to conduct experiments and research.

Fifth direction - the use of a scientific form of labor organization - assumes that the content of education must correspond to the boundaries of the boundaries in the field of medical biology and information technology. In the teacher's lesson, student scientific terminology, symbolic notations and formulas are used for the gradual development of scientific thinking and the formation of a conceptual apparatus.

To achieve such an organization of the educational process, it is necessary to have only the identified knowledge of the subject, forms and methods of teaching, but also to have a good understanding of your students, the typical characteristics of the classroom team and to study the abilities of each student, with the teacher working in the classroom.

This study has undertaken an effort to assess the impact of virtual programs on the development of research skills among students in the context of biology education. The results of the experimental teaching demonstrated that the integration of modern technologies into the educational process significantly enhances the preparedness level of students in this field.

Virtual programs offer unique opportunities for creating interactive and profound educational experiences, enabling students not only to acquire theoretical knowledge but also to apply it in practice. Interactive laboratories and simulations, made accessible through virtual programs, empower students to conduct experiments and research in a virtual environment, thereby fostering critical thinking and analytical skills.

Furthermore, the findings of this study underscore the importance of continually updating educational methodologies in light of modern technological advancements. Pedagogical tools, including virtual programs, can serve as effective means to activate the learning process and motivate students to engage more deeply with the subject matter.

Overall, the results of this study highlight the prospects and potential of virtual educational tools in contemporary pedagogy. The development and implementation of modern technologies in the educational process have the potential to make a significant contribution to enhancing the quality of education and preparing future specialists in the field of biology.

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