

THE EDUCATIONAL AND UPBRINGING SIGNIFICANCE OF RESEARCH LESSONS IN DEVELOPING STUDENTS' COGNITIVE ACTIVITY IN BIOLOGY CLASSES

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ANNOTATION: This article reveals the role of research lessons in developing students' research competencies in biology classes. It also covers definitions of a lesson and research skills, the functions of a lesson, requirements for teacher and student activities in guiding learners toward research activity, and the stages of a research lesson.

KEY WORDS: biology, education, state educational standards, educational research, student, technologies, skills, competence, teacher, curriculum, lesson, information.

INTRODUCTION

According to the requirements of State Educational Standards, the final outcomes of project-based and research-based learning activities in biology are evaluated not only by subject-specific results but more by indicators such as students' intellectual and personal development, growth of competencies in research and project activities, formation of collaboration and independent work skills, and understanding the essence of research and project work. This is primarily связано with the new information environment, where there is increasingly less space for individuals who cannot independently develop their professional and social competencies. A modern worker in any field must process completely new information, make unconventional decisions, and justify and defend them. The integration of technologies and theoretical knowledge has reached such a stage that it has become necessary to organize the educational process on a new basis and prepare students for future professional activities.

Pedagogues and methodologists define a lesson as follows: "A lesson is the main form of educational activity conducted by a teacher with a class, that is, with a permanent group of students of similar age and level of preparation, under the conditions of a state curriculum, a fixed schedule, and a school setting."

A biology lesson performs several functions: educational, воспитательный (upbringing), and developmental. Recently, the functions of a biology lesson have expanded, and self-learning and motivational functions have become increasingly important.

A modern biology lesson requires the teacher to organize students' learning activities differently. The teacher organizes students' work with textbooks, natural objects, and various visual aids, which serve as sources of knowledge. In this process, students acquire knowledge and transform it into skills and competencies. Thus, a modern lesson implements an activity-based approach in education.

In 9th-grade biology classes, the teacher encourages students to engage in research and project activities and develops basic research skills: following rules when working with magnifying instruments and equipment, observing living organisms and their own bodily conditions, conducting biological experiments, and working with biological information from various sources.

A research lesson is a type of lesson that maximizes students' cognitive activity and motivates them to study knowledge deeply and conscientiously. In such lessons, all students in the class are active and work with interest and enthusiasm.

Research is one of the four universal types of thinking activity and best corresponds to the socio-cultural foundation of education. The goal of research-based learning is to develop analytical thinking, the ability to see logical connections between facts, to form skills for generating new knowledge through analysis of material (primary sources), and to prepare students for independent research work. In this approach, the main focus is not only on mastering knowledge, skills, and abilities, but on developing personality and

thinking.

The research-based approach in teaching biology performs the following functions: creating positive motivation for learning, forming deep, strong, and practically significant knowledge, and developing cognitive activity and independence.

The structure of a research lesson includes the following stages:

Stage 1. Activating prior knowledge.

Stage 2. Demonstration of a problem-based experiment.

Stage 3. Formulation of the research objective by students.

Stage 4. Independent inquiry activity.

Stage 5. Differentiated group work.

Stage 6. Interpretation of the obtained data.

Stage 7. Discussion of the results.

Stage 8. Drawing conclusions based on the research findings.

Stage 9. Lesson summary.

Stage 10. Homework.

The purpose of the lesson is to develop students' functional research skills through a research-based lesson, that is, the ability to independently acquire new and solid knowledge, to develop research thinking, and to increase students' personal activity in the learning process. Thus, the main outcome of a research lesson is an intellectual and creative product (knowledge) that determines a certain truth as a result of the research process.

The formation of research skills occurs directly in the process of students' research activities. When starting research, it is necessary to answer not only the question "How will we do this?" but also "Why are we doing this?" and "What is its significance for us?" It is important that each participant in the research can answer the question: "What can I personally do to solve this problem?" At the same time, teachers should take into account students' interests, select tasks that correspond to their abilities and capabilities, which contributes to personal development. It is also important to preserve the meaning and purpose of conducting research.

During this lesson process, students develop research skills. There are various definitions of the term "research skills." Some of them include: the ability to conduct independent observations and experiments; skills formed in the process of solving research tasks; the ability to apply research methods when solving a specific problem or completing research assignments; mastering a system of complex psychological and practical actions necessary for cognitive processes in all types of learning activities; being key components of personality that reflect the leading characteristics of professional development, express the universality of interaction with the environment, stimulate creative self-expression, and determine effectiveness in any cognitive and practical activity.

The role of the teacher increases in the process of forming students' research skills. The teacher poses problems, creates problem situations, provides students with necessary factual materials, and manages their activities.

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At the same time, teachers should consider students' interests and select tasks that best match their abilities and contribute maximally to their personal development and formation. It is also necessary to maintain the logical consistency of the research process.

The principles of skill formation methodology are that the skills must correspond to the nature of the learning material. A very important aspect is identifying a system of activity skills that should be developed during the study of a particular section, topic, or lesson in biology. The methodology should enable students to master methods of action that they can apply in each new situation.

In lessons, one of the most widespread and effective forms of conducting research is working in small groups.

The use of group work methods opens broad opportunities for developing communicative activities outlined in new generation standards, enhancing thinking, developing the student's personality, and implementing true differentiation and individualization in education. When students work independently in small groups conducting research, attention should be paid to the following:

Students' interests should be taken into account when involving them in research activities. Everything being studied should be personally meaningful to the student, increase their interest, and enhance their level of knowledge. However, the proposed topics and recommended research methods should not exceed the student's capabilities. Research activity should stimulate the desire to work, not discourage due to difficulty or incomprehensibility.

For example, theoretical research is aimed at studying and generalizing facts and materials from various sources. Such research topics allow students to study different objects in real environments and in motion, provide abundant material, and give students opportunities to develop their own research ideas and hypotheses.

Educational experiments are one of the effective teaching methods. Laboratory and practical work are especially important, as they allow students not only to study biological objects but also to become familiar with the methods of biological science and help develop research skills.

Research skills that can and should be developed in general biology laboratory work include: understanding the essence of a problem and posing a problem question; developing and justifying hypotheses; defining research tasks; selecting and analyzing literature data; conducting experiments or observations; recording and processing results; drawing conclusions; preparing a report on the conducted research; and reflecting on the problem-solving algorithm.

The level of students' independent activity in laboratory work depends on the variability of tasks, their novelty, the presence of problem-based assignments, and students' motivation. It is difficult to argue with the need for a solid and frequently updated material base for conducting laboratory work. However, currently, more attention in schools is being paid not to laboratory equipment itself, but to providing materials necessary for educational and research activities.

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