

Pedagogy the Effectiveness of the Use of Design Technology in the Development of Research Activities of Students in the Process of Biology Education in Higher Education Institutions

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Abstract

In educational practice, most of the knowledge is presented ready-made and does not require additional research efforts, but the main challenge for students is to search for information independently, to acquire knowledge. Therefore, one of the most important conditions for increasing the effectiveness of the educational process is the organization of educational and research activities of students and the main component of which is the development of research skills. The project method allows students, on the one hand, to independently acquire new knowledge and methods of work, on the other hand, to create conditions for the practical application of previously acquired knowledge and skills.

Keywords: *student, research, scientific creation, educational activity, organizational, design method, project, express, competition, collection, flora, fauna, microscope.*

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Introduction

Modern approaches in the education system require students to strive for creative work, professional and methodological competence and the ability to master the world of professional social values at a high level. At this stage of the formation of a creative specialist, special attention should be paid to the research activities of students.

In educational practice, most of the knowledge is provided ready-made and does not require additional research efforts, but the main challenge for students is to search for information independently, to acquire knowledge. Therefore, one of the most important conditions for increasing the effectiveness of the educational process is the organization of educational and research activities of students and the main component of which is the development of research skills. This not only helps students to meet the requirements of higher education qualifications, but also creates an internal motivation for learning activities, shaping them as mature professionals.

Methodical Part

The content of research assignments is aimed at developing students' cognitive independence, fostering a caring attitude to nature, developing special learning skills, studying the diversity of flora and fauna, especially in their area, filling the biology classroom with herbariums and collections.

The research is based on the idea of solving a problem. This is necessary through various organizational forms of teaching: lesson, (lesson - seminar, lesson - defense of ideas, lesson - role-playing, lesson - conference, etc.), additional lessons, project activities, group, individual, pair forms of students' research activities formation.

Types of research activities:

1. Express-research: the goal is to conduct research independently and design according to the description. For example - observing birds in the feeder, observing the behavior of pets, and so on.
2. Conducting training practice: this includes laboratory and practical training. Learning experience—This is one of the most effective teaching methods.
3. Research - competition. It is also effective in lessons. For example, finding errors in a test.
4. Creative assignments.
“Journey with a drop of water on a plant”, “Journey to the world of cells” compositions, crossword puzzles, quizzes, presentations.
5. Summer assignments: herbariums, collections
6. Types of extracurricular research activities: preparation and participation in biology Olympiads, competitions, environmental cleaning, creative work, writing essays.

The following methods are used in the development of students' research activities; reproductive, partial-research, and research. Students will be introduced to the technology of research activities. Laboratory and practical classes play a special role in the development of students' research activities in the process of biology education.

Then:

- 1) study of biological objects under a microscope;
- 2) study of the composition of living things;
- 3) study the structure of organisms;
- 4) observation of objects of living nature;
- 5) observation of the processes of vital activity of organisms;
- 6) study the levels of organizational structure of living matter (species and ecosystems).

Partial research laboratory work

Demonstration card.

1. Examine micro-preparations (samples) of frog and human blood.
2. Compare the red blood cells of a frog and a human, pay attention to the size of the red blood cells, whether there is a nucleus.
- 3). Conclude: whose blood carries more oxygen per minute, and why?

Laboratory work of research nature.

Demonstration card.

- 1) Examine the microscopic structure of frog and human blood by comparing their red blood cells.
- 2) Find and analyze the evidence that someone carries more oxygen per unit volume of blood per unit volume.
- 3). Conclusion: You can base it on the working hypothesis: "Oxygen transfer will depend on ..., so you need to find evidence of these causes."

Lesson "Regulation of respiration"

Laboratory work "Determination of respiratory rate."

Demonstration card.

- 1) Observe the movements in the chest.
- 2) After sitting 10 times, count how many breathing movements you did in 1 minute while sitting.
- 3) Explain the difference in the data obtained and write a conclusion.
- 4) Solve the following biological tasks:
 - A) How much air passes through the human lungs in 1 minute, 1 hour and 1 day (breathing - 500 ml of air, breathing rate - 18 times per minute).
 - B) If you know that the air you breathe contains 20% oxygen, determine how much oxygen a person inhales through the lungs during the day when they breathe in peace.

When organizing learning activities, it is important to organize the research process in such a way that students master the research process without difficulty: you can focus on the importance of the expected results, offer an original or unexpectedly structured learning task. It is important to give students an “idea” of a more general problem than is reflected in the assignment. Ideally, the problem should be created by the student himself, but in practice this is not always effective.

In my practice, I try to offer students important, challenging assignments that turn out to be fun rather than challenging in subsequent work. Such assignments are presented to learners in the form of motivation, a simple reasoning, in the process of searching for the essence of the laws. Such assignments encourage students to make simple justifications, to look for patterns.

These include tasks such as working with ready-made herbarium specimens, collections and models of plant, animal and human organs. Students conduct research on the study of basic anthropometric data, draw conclusions about the impact of environmental factors on human health and physical development.

Design technology is not a novelty in world pedagogy, as it was developed in the 1920s by the American philosopher and educator J. Dew and his student V.H. It is based on the design method developed by Kilpatrick [1].

Organizing design activities on the basis of creative projects provides students with a high degree of freedom. They do not have a pre-defined and developed structure. The teacher only defines the general parameters of the project and shows the optimal ways to solve the given tasks [2].

Creative projects allow students to provide a high level of creative potential and stimulate their research activities.

Research projects are characterized by a well-defined, well-thought-out and well-founded structure, the purpose of which is relevant and important for the participants, and the use of scientific methods in the processing and formalization of results. At the same time, the focus is on introducing students to the content and methods of research.

The topic of research projects is the most relevant for modern science and should serve to develop students' research competencies.

In general, design activities help:

- formation of motivational and valuable attitude, creative activity and imagination in students to professionally oriented activities;
- development of reflexive-assessment skills of students aimed at self-assessment, development and expression;
- Orientation of students to creative problem solving;
- directing students to research activities in the framework of project work;
- gaining experience in the team;
- formation of communicative skills, flexibility and creative communication style [3].

Other pedagogical technologies aimed at unlocking and developing the creative potential of young scientists can be highlighted: role-playing and storytelling games, pedagogical production, teaching technology as educational research, collective thinking technology, heuristic teaching technology.

The step-by-step organization of research work is followed by more laboratory classes.

Organizing research in the classroom in accordance with the assignments; if the teacher intends to perform certain tasks of the lesson for all students, the other part is developed in terms of the possibility of a differentiated approach only for gifted students.

Laboratory work can be organized in several ways.

1. Independent work organized in the process of learning new material has the character of research, serves as a source of acquisition of new knowledge. Example: Topic "Shaped branches". The task at the beginning of the lesson is to prove that the rhizome, tuber, and bulb are a deformed rod. Students complete the laboratory lesson using the instruction card, draw conclusions.

Laboratory work to reinforce the material learned can be a reinforcement of the knowledge gained about plants and animals, a guide to familiar material, and a confirmation of the teacher's story.

Taking into account the modern requirements to the educational process, the first option of organizing work in biology classes can be preferred as the most effective in terms of educational relations.

Student research can be organized in a variety of ways using natural handouts. Some work can be done outside the classroom or partly in the classroom and partly outside, which allows you to continue your research in the Young Researcher, Green Lab circle, optional course project, and field trips.

Practice shows that the use of elements of design technology, problem-solving, research, research, heuristic teaching methods makes the learning process more efficient. Helps to achieve certain goals in the development of students' research skills and activities: increasing students' interest in learning, directing them to achieve better results.

The main requirements for the organization of the project:

- The project is created on the initiative of students and should be meaningful for them and those around them;
- the problem to be solved by the project and the expected results should be of practical (possibly scientific) significance;
- students' work on the project is independent and research nature;
- The project is pre-planned and developed, based on clear goals and objectives, changes are allowed in its implementation.

The project method allows students, on the one hand, to independently acquire new knowledge and methods of work, on the other hand, to create conditions for the practical application of previously acquired knowledge and skills [3].

The training project includes a type of community activity. One of its main tasks is to make interdisciplinary connections in the process of interaction of these students and with the teacher and to create some kind of educational product. Thus, conditions are created for students' continuous self-education, intellectual and creative development.

During the internship, a sequence of work can be used that includes several steps on the project: preparation, planning, research, formulation of results and conclusions, project defense, results evaluation, and the process of design activities. For example, the topic "Respiration" ends with the lesson "Respiratory diseases, their prevention." During the course, students were involved in a research project "Study of the functional capabilities of the respiratory system in smokers and non-smokers." To do this, a working hypothesis is put forward: "Does smoking affect the functioning of the respiratory system in adolescents?" and research methodology will be explored. Two adolescents participated in the study: one smoker and the other non-smoker. In the lesson, we analyze the information obtained, and a creative group of students is engaged in the design of the project outside of class time [4].

Conclusion

Student activity is not only the satisfaction of the need for knowledge, but also the scope of all needs for the development of the student's personality: self-affirmation, self-expression, self-determination, self-awareness. The student adapts himself to society, passes the first social tests, that is, improves himself.

Thus, the main problem of teaching is to create a problem situation, in the process of solving this situation, students form ideas about the logic of scientific knowledge and research methodology, which helps to form the focus, activity and motivational components of students' research activities.

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