



**DEVELOPING STUDENTS'
INDEPENDENT SEARCH AND CREATIVE
ACTIVITY BASED ON A PROJECT APPROACH
IN BIOLOGY LESSONS**

Bukhara State Pedagogical Institute
First-year basic doctoral student
Ibragimova Sitorabonu Akmal kizi
sitora15.05ibragimova@gmail.com

Abstract. *This article highlights the issues of developing students' independent research and creative activity based on a project-based approach in biology lessons. It describes the methodological aspects of increasing student activity in the process of deeply mastering biological knowledge, observing, analyzing, drawing conclusions, and performing creative tasks. The article substantiates that biology lessons organized based on a project-based approach develop students' skills in independent thinking, finding solutions to problem situations, working in collaboration within a group, and presenting their results.*

Keywords: *biology lessons, project-based approach, independent research, creative activity, student activity, biological knowledge, methodology, practical skills, analysis, lesson, student, activity.*

Аннотация. *В данной статье освещаются вопросы развития самостоятельного поиска и творческой активности учащихся на уроках биологии на основе проектного подхода. В ней излагаются методические аспекты повышения активности учащихся в процессе глубокого усвоения биологических знаний, наблюдения, анализа, выводов и выполнения творческих заданий. В статье обосновывается, что уроки биологии, организованные на основе проектного подхода, развивают у учащихся навыки*

самостоятельного мышления, поиска решений проблемных ситуаций, совместной работы в группе и представления своих результатов.

***Ключевые слова:** уроки биологии, проектный подход, самостоятельный поиск, творческая активность, деятельность учащегося, биологические знания, методика, практические навыки, анализ, урок, учащийся, деятельность.*

Main part. Forming students' independent research and creative activity in biology lessons is one of the important directions of the educational process. Since biology is directly related to living nature, the human body, the ecological environment, and vital processes, it creates broad opportunities for students to develop observation, analysis, conclusions, and practical thinking skills. During the lesson, students must not only master ready-made information but also independently study biological phenomena, link them with real-life examples, and be able to justify their opinion. In this regard, the project-based approach is of great importance as an effective methodological tool that directs students toward active research.

Biology lessons organized on the basis of a project-based approach increase students' activity in the learning process, forming skills for independent decision-making, problem-solving, group work, and presentation of results. In such lessons, the student becomes not a recipient of the ready-made knowledge provided by the teacher, but an active participant who searches, observes, compares, and creates a creative result. In particular, when topics such as plant life, human health, environmental problems, and the habitat of living organisms in

biology are studied through project assignments, students' interest in the subject increases, and their knowledge acquires practical content.

Organizing the educational process based on a project-based approach in biology education requires thorough methodological preparation from the teacher. Such activity will yield the expected results only if the lesson content, selected tasks, the age characteristics of the students, the level of complexity of the topic, and the existing conditions are taken into account. Project-based work should be organized in connection with the main goal of the lesson, rather than as a random or additional task. In the process of applying the project-based approach in biology lessons, favorable conditions are created for students to think independently, conduct research, observe, and create creative results. In this process, topics are linked to real-life problems, and students present themselves as small researchers. The teacher instructs them, directs them with the necessary questions, but does not provide all the answers ready-made. The methodological requirements for applying the project-based approach in biology lessons, the content of tasks that enhance students' creative activity, and the ways of organizing independent research are widely covered. These issues play an important role in increasing the practical effectiveness of biology education.

Object of research and methods used. To effectively apply the project approach in biology lessons, the content of the lesson must first be clearly defined. Each project or creative task should correspond to the educational topic, contribute to a deeper understanding of biological concepts, and ensure the active participation of the student. If the task deviates from the topic, it will not serve the main content of the lesson. Therefore, the teacher must link the content of the project with the

curriculum. One of the methodological requirements is that the task must correspond to the age and level of knowledge of the students. If students with basic concepts are given very complex research, they will struggle and their interest will decrease. On the contrary, an overly simple task does not evoke a need for research in them. Therefore, tasks should be chosen with moderate complexity, in a form that encourages thinking, but is achievable.

Creating a problem situation is of great importance when applying the project approach. When a student has a question or problem, they try to find an answer. For example, questions such as "Why do some plants in the schoolyard not grow well?," "How does a lack of water affect living organisms?," "What changes do harmful habits cause in the human body?" actively involve students in the topic. Such questions transform the lesson from a simple presentation into a process of inquiry.

Methodologically, it is also important that the evaluation criteria are clear in advance. If a student knows what to pay attention to in their work, they will act purposefully. For example, the disclosure of the topic, the correct use of biological concepts, the organization of information, the drawing of conclusions, the creative approach and the quality of presentation can be evaluated. Such criteria encourage the student to be responsible. It is also important to follow safety and hygiene rules in biology lessons. If pupils are working with plants, soil, water samples or laboratory equipment, the teacher should explain the precautions to them. This is necessary not only for healthcare but also for the cultural organization of practical work.

It is important that there is a problem with the content of the tasks. The problem forces the reader to think. For example, works based on

questions such as "Why do some seeds germinate quickly, while others develop late?," "Why is clean air necessary for the human body?," and "How does soil pollution affect plant growth?" strengthen the student's analytical approach. Students participate more actively when creative assignments are close to their personal experience. For example, topics such as "Healthy Eating Habits in My Family," "Caring for Houseplants at Home," "The Environmental Situation in Our Neighborhood," and "Simple Ways to Save Water" are significant because they are close to the student's life. Through such work, the student connects biological knowledge with their life. Creating a visual result when performing tasks also increases creative activity. Students can prepare a booklet, table, illustrated poster, biological model, diagram, presentation, or brief reference. Such activity is more effective than merely explaining the topic verbally, as the student processes the acquired knowledge and expresses it in a unique form.

Creative tasks in biology lessons can be completed both individually and in groups. Individual assignments develop the student's independence. Group work, on the other hand, develops skills in collaboration, communication, and task distribution. For example, if one group collects information, the second group prepares a drawing and diagram, and the third group draws a conclusion. At the end, all groups present their results. There should be creative freedom in assignments. If a student is given the opportunity to choose the form in which to present the result, they will demonstrate their abilities. Some students are good at writing, others are active in oral presentations, and still others are active in preparing drawings, diagrams, or models. This approach brings out the different abilities in the classroom. Tasks that

enhance creative activity in biology lessons should be problem-based, life-like, practical, and visual in content. They encourage the reader to think, observe, search, draw conclusions, and express their views. Through such tasks, biology lessons become more interesting and effective.

Results obtained and their analysis. Organization of students' independent research in biology lessons helps them master knowledge more deeply. In the process of independent research, the student does not wait for ready-made information, but searches for it, analyzes it, and comes to the necessary conclusion. This process increases the student's activity, strengthens their responsibility, and expands their horizons. The initial stage of independent research begins with defining a topic or problem. The student must know what to learn, what questions to answer, and what results to achieve. For example, topics such as "The Influence of Light on Plant Growth," "The Significance of Water for the Human Body," and "The Environmental Situation in the School Area" are convenient for research because they are clear and understandable.

At the next stage, students gather information. They may use textbooks, supplementary literature, internet resources, observations, interviews, or case studies. At the same time, the teacher must instruct students on the correct selection of sources, the separation of reliable information, and the rejection of unnecessary information. Because independent research is not only about collecting a lot of information, but also about the process of consciously selecting the necessary information.

Observation in biology lessons is an important form of independent research. Students can observe seed germination, the development of indoor plants, leaf changes, the movement of animals, or the impact of weather conditions on living organisms. Expressing the results of the

observation through a table, a drawing, a diary, or short notes helps the student work in an orderly manner. In independent research, the analysis stage is of particular importance. The student compares the collected information, distinguishes the main ideas, and identifies cause-and-effect relationships. For example, by comparing the development of plants grown in two different conditions, they understand the importance of light or water. Such an analysis leads to a deeper understanding of the topic.

The use of a system of questions is effective in organizing students' independent research. The teacher can ask the students leading questions such as "What did you observe?," "What difference did you notice?," "What could have caused this change?," "What conclusion did you come to?." Such questions help the reader focus on the main issue without getting lost in the process of research. The presentation of the result is also an important part of independent research. The student must be able to draw conclusions from their work and explain it to others. The presentation can be in the form of oral information, a poster, a table, a diagram, a picture, a booklet, or a short written report. In this process, the student learns to express their thoughts in an orderly manner, answer questions, and speak with evidence.

To maintain students' interest during independent research, topics must be life-like. For example, topics such as healthy eating, harmful habits, water conservation, environmental protection, and houseplant care are directly relevant to the student's life. Therefore, they approach such issues with greater interest. Thus, organizing independent research in biology lessons develops not only students' knowledge but also their culture of thinking. They will have the skills to search for information,

sort it, observe, analyze, draw conclusions and present it. This is an important condition for the formation of creative activity.

If the didactic conditions are organized correctly in biology lessons, students will master the topic more deeply. They ask questions, observe, exchange opinions, draw conclusions, and express their results. It is these processes that enhance the creative activity of students. To develop creative activity in biology education, a free and active environment must first be created in the lesson. If a student is not afraid to express their opinion, ask a question, or make a guess, they will actively participate in the lesson. In such an environment, students' interest increases, and they begin to express a personal attitude toward the topic. The teacher must value every thought, encourage students, and encourage them to search.

Another didactic condition is the vitality of the lesson content. Many topics in biology are related to students' daily lives. For example, issues such as healthy eating, personal hygiene, plant care, animal care, water conservation, and waste reduction are understandable and relevant for students. Through such topics, they connect biological knowledge with real life.

The use of visual aids also plays an important role in the development of creative activity. The science of biology is best mastered through sight, observation, and comparison. Drawings, tables, diagrams, video materials, natural objects, models, and laboratory equipment help students more clearly visualize the topic. When a student tries to explain what they have seen and observed, their thinking activates.

The use of problem situations in the lesson is also one of the effective conditions. Instead of giving students a ready-made conclusion, you should ask them a question or a problem. For example, questions such as

"Why do plants grow sparsely in some areas?," "What changes occur in the life of living organisms if water is polluted?," "How does improper nutrition affect the body?" force students to think.

Group activity is also one of the favorable didactic conditions. In the process of group work, students exchange ideas, divide tasks, listen to each other, and create a common result. This process develops their skills in communication, agreement, justification of their opinion, and respect for the opinions of others. Organizing ecological topics, observational work, and project assignments in groups during biology lessons yields good results. The development of students' creative activity based on a project-based approach in biology education is one of the important directions of the modern educational process. Since the subject of biology is based on life, practice, and observation, it provides students with broad opportunities for independent thinking, analyzing natural phenomena, and forming their own conclusions.

The project-based approach enhances students' engagement in the lesson. In this process, they collect information, observe, compare, summarize, and present the result in various forms. This fosters independence, responsibility, initiative, and a creative approach. To develop creative activity in biology lessons, it is effective to use problem-based questions, practical assignments, visual aids, group work, and independent research. Especially when topics are linked to life situations, students gain a deeper understanding of the subject and learn to apply their knowledge in practical activities. Based on this, it can be said that the use of the project-based approach in biology education serves to develop students' creative activity, increase their interest in science, and form them as independent thinkers.

Conclusion. Developing students' creative activity based on a project-based approach in biology education serves to organize the lesson process more meaningfully, effectively, and actively. Through this approach, students do not receive biological knowledge ready-made, but acquire it through independent research, observation, analysis, and conclusions. As a result, they develop an interest in science, independent thinking, skills in finding solutions to problematic situations, and applying knowledge in practical activities.

In biology education, favorable didactic conditions are necessary for the development of students' creative activity based on a project-based approach. During the lesson process, the student must be not only a listener of ready-made knowledge but also an active thinker, a seeker, and a participant who creates their own results. To achieve this, the teacher must enrich the lesson content with interesting, real-life, and problem-based situations. The conditions serving the development of creative activity, the formation of students' analytical and conclusions-making skills, and the evaluation of work performed based on the project are highlighted. These aspects serve to strengthen students' creativity in biology education, develop their independent thinking, and prepare them for practical activities.

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