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Digitalization of Project Lessons in Teaching "Natural Sciences" In General Secondary Schools

D.A.Norbo‘tayeve

Senior Researcher, Project Executor, National Institute of Educational Pedagogy named after Qori Niyazi, Uzbekistan

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ABSTRACT

Compared to traditional activities at school, the project method allows students to increase their motivation to learn. Directly from this, various educational tools are important in organizing cognitive activity in the process. In particular, these include the use of modern computer technologies (computer telecommunications, electronic databases, virtual libraries, video, multimedia and pedagogical software) and traditional educational tools (encyclopedias, manuals, mass media).

Keywords: Natural sciences, modern approach, biological concepts, educational process, digital education, project method, design, independent work skills, creativity.

INTRODUCTION

The idea of digitizing project lessons in teaching "Natural Sciences" in general secondary schools allows for the effective organization of the educational process and expanding the use of modern technologies. To implement this approach, the following main aspects can be considered:

The essence of digitizing project lessons - Students have the opportunity to actively participate in projects and independently develop their knowledge and skills. By organizing project lessons on platforms such as Moodle, Google Classroom, Edmodo, students can work with educational materials remotely. Using animations, 3D models, video lessons and virtual laboratories in the study of natural sciences.

2. Advantages of digitization - Students use rich resources in science. The ability to choose tasks and projects that suit the abilities of each student. The ability to connect theory with practice through virtual experiments. The use of modern software tools in project lessons encourages students to take new approaches.

3. Stages of digitizing project lessons - The teacher selects

resources appropriate to the topic and project goals. Software or online platforms that are appropriate to the subject content are selected. Textbooks, laboratory work, tests, and other educational materials are digitized. Platform integration is carried out to monitor and evaluate the project process. Continuous exchange of ideas between students and teachers.

Biology: Studying the structure of cells with a virtual microscope.

Chemistry: Carrying out reactions and experiments in virtual laboratories.

Physics: Explaining the laws of force and motion through simulations.

Digitization of project lessons in teaching natural sciences is of great importance in modernizing the educational process. This not only deepens students' knowledge, but also teaches them to adapt to new technologies. In this direction, it is necessary to provide comprehensive methodological and technical support.

As we noted above, the initial concepts of nature are

currently being taught to students through the “Natural Sciences” textbook for primary grades. This subject is considered an integrative subject. In it, the skills of understanding nature are explained in the context of the interconnectedness of biology, physics, geography and chemistry, while highlighting the content of the topics. At the same time, astronomical concepts are also reflected in the content of the textbook.

The beginning of the initial biological concepts is continued in the 5th grade of general secondary education through the textbook “Introduction to Biology”. Considering that the orientation to project work began in the primary grades, it is advisable to involve 5th grade students in project work as well. In this case, the project topics recommended for children should be simple and understandable.

The project method cannot be implemented in one lesson. For this, the teacher must plan a specific topic in advance. The content of the topics selected for research should be sorted and presented clearly, within the scope of a subject section, one topic of the course, between quarters (between quarters), between different subjects (interdisciplinary). Of course, appropriate time is spent on completing the research work. For example, a project on the topic “Let’s save butterflies” is selected to study the butterflies living around us.

5 students are combined into a team. Each is clearly assigned tasks. The specified period is determined by the time interval for observing the lifestyle of butterflies and their reproduction and development. This period is determined by the teacher, taking into account the student’s ability to collect scientific data as a result of his research. During the period, the student group will first scientifically analyze the butterfly section, and learn how many species of butterflies exist in the environment in which they live.

After that, experimental work begins according to the plan. In this case, using the necessary learning tools, observation of the behavior of butterflies in the outdoor environment begins in the vicinity of the house, school garden, neighborhood or neighboring neighborhood. For the sample, butterflies are caught using special catching devices, photographed and released into nature without harming them. All work is carried out according to a pre-prepared plan.

It takes a lot of time to complete the project, therefore, first

of all, the topic being studied is developed, and then a specific lesson is developed. Structuring is carried out in accordance with the logic of students’ cognitive activity on a specific topic, program issues, and time is set for working on the project in each lesson.

The main stages of working with the project.

- 1) The teacher plans the project within the program.
- 2) The teacher puts forward the idea in the lesson.
- 3) Discussing the idea with the student, putting forward their own ideas.
- 4) Formation of microgroups.
- 5) Distribution of tasks to microgroups.
- 6) Practical activities of students within the project.
- 7) Intermediate verification of work results.
- 8) Discussion of project design methods.
- 9) Multimedia presentation of results.
- 10) The result of work on the project, discussion of results, evaluation, plan for the future project.

The implementation of the project will be more effective if the project team uses not only traditional, but also other sources of information, for example, pedagogical software, training and the Internet. Preparation for the presentation is carried out online using a presentation program. At the same time, students search, search and save information, select photos, drawings, diagrams and animations. This stage of work is interesting because they learn to analyze information, select information relevant to the topic, conduct research and compile material. The teacher monitors and controls each stage of the students’ work on the project, gives advice.

The design method is an activity of the teacher to build a model of the future activity, to select methods and means within the established time frame in the existing conditions, to determine the stages of achieving the goal, to correctly set the goal, to formulate specific tasks on their basis, to determine the method, methods and means of conveying educational information to the student. The organization of biology education based on the project

method allows for integrated teaching, which involves the practical application, analysis and evaluation of knowledge and skills of the student [76].

In comparison with the use of other teaching methods, the project method actively involves students in the process of mastering a new topic, in its high-level planning, organization, analysis of existing results and self-assessment during the implementation of the task assigned to the lesson. The educational project method teaches students to easily understand the topic by providing the opportunity to solve specific tasks in the lesson. The project method can be interdisciplinary, within one subject or within a subject.

Designing is carried out in two ways - on an individual and group basis. Both directions have their own positive and advantageous features. The use of design methodology in biology lessons increases the quality and efficiency of education in the educational process, directs schoolchildren to work independently for a specific goal when working on a project based on a specific plan. Ultimately, in the process of carrying out research work carried out by students in biology lessons within the framework of a specific project, the following features are formed:

Currently, the introduction of such technologies and methods in the education system not only helps students to easily master the subject, but also serves to organize an individual approach to students by teachers. Now, new educational standards and textbooks, in accordance with the content of textbooks, pay more attention to the development of teaching skills for students to work on themselves, independently prepare practical exercises in the classroom and in extracurricular activities. In this sense, in biology lessons, students are guided in the form of small research studies to choose a topic of interest to them and study problems directly related to it. Small research studies of this form directly allow the student to master modern methods of searching, processing and using information, to master some methods of scientific research, to determine his research position, to continue the small research he is conducting, and over time to bring his research skills to the level of competence [72, 76].

The organization of project lessons in teaching "Natural Sciences" in general secondary schools is an innovative approach to the educational process. This method helps to provide students with deeper knowledge in teaching,

develop their practical skills, and increase their ability to think independently and work in a team.

What are project lessons and their importance?

Project lessons are activities aimed at achieving a specific result by students within a specific topic. This method has several advantages in teaching natural sciences:

Teaching through experience: Students apply theoretical knowledge in practice in mastering natural sciences.

Research skills: Students develop the skills of observation, conducting experiments, analyzing results, and drawing conclusions.

Creative approach: Projects stimulate creativity and allow you to try out new ideas.

Project lessons are carried out in several stages:

Choosing a project topic and setting a goal: The project topic should be consistent with the curriculum and arouse the interest of students. Example: "The impact of atmospheric pollution on plant life."

1. Planning: Specific tasks are set for each stage. Students are provided with the necessary materials and tools.

2. Research process: Students conduct experiments or studies, collect data. For example, analyzing different qualities of water is associated with laboratory work.

3. Analysis and presentation of results: Students analyze the collected data and draw conclusions. The results are presented in the form of slides, posts or reports.

4. Evaluation: The teacher evaluates the final result of the project, the participation of the team and the approach to solving problems.

Examples of project lessons in natural sciences

Chemistry: "Creating safe cleaning products at home."

Biology: "Creating a catalog of plants suitable for arid regions of Uzbekistan."

Physics: "Creating a small device project for collecting solar energy."

Recommendations for teachers

Support and guidance: Providing students with the necessary information and directions during the project.

Innovative approach: Using interactive technologies (virtual laboratories, online platforms).

Development of social skills: Developing students' communication and cooperation skills through teamwork.

Project evaluation criteria

- Relevance to the project topic.
- Clarity and reliability of the experimental results.
- High quality of presentation.
- Team participation and creativity.

Project lessons in general secondary schools play an important role in making the educational process interactive and interesting in teaching natural sciences. This method develops students' independent and creative thinking, builds practical skills, and increases their interest in science.

The concept of understanding that the implementation of the project directly depends on one's own activities arises, which creates a high sense of responsibility in the student;

In the process of implementing all stages of the design method, students gain experience from the birth of an idea to the final reflection;

It becomes a fully controlled process in developing the most important knowledge and skills in students (research, evaluation, independent thinking, independent decision-making, presentation).

After all, junior researchers in secondary schools, when they go to vocational colleges, academic lyceums, and higher education institutions tomorrow, must first of all turn their research skills into competence, and in order to develop it, the main foundation must be laid for students to acquire comprehensive knowledge and skills in the classroom, in extracurricular and extracurricular activities. In such conditions, the orientation to science not only interests students in participating in Olympiads, various stage-by-stage competitions, competitions, but also

teaches them to use their free time productively.

Another stage in the development of research competence of senior students is to teach students to write a research paper, first of all, to explain and implement the art of writing small scientific articles based on the results of their scientific work. Such a methodology for involving students in research activities allows them to develop the skills of research work, to teach them to present their work, and ultimately to develop the skills of self-management, to teach them to realistically demonstrate their knowledge and skills based on their presentation.

Based on the formation and development of students' research competencies in biology, a didactic system is developed within the framework of the implementation of research results and scientific research work.

That is, an opportunity is created for students to carry out research work in existing forms of education in general secondary schools. In this case, the demonstration of their achievements and results in various competitions, their presentation as an example, and frequent recognition by school administration and teachers also play a great role in further developing students' interest in research work.

The project method is an educational approach aimed at students' acquisition of knowledge through research, analysis and practical work under the guidance of a teacher to solve a specific problem or task. This method is aimed at developing students' creative, analytical and practical skills, forming their independent thinking and self-development abilities.

Basic principles of the design method. The project is based on a real problem or an interesting question. For example, "What can be done to develop renewable energy sources?" Students look for ways to solve the task using scientific and practical methods. Students independently actively participate in the process of collecting information, analyzing it and creating a project. Teamwork is carried out, the role and contribution of each participant is determined. The results of the project are presented to the public, discussed and evaluated.

Stages of the design method. A relevant topic is selected for the project.

Example: "Effective methods for reducing atmospheric pollution." Tasks are determined for each stage. Resources

and tools are selected. Students collect the necessary data, conduct experiments or develop models. For example, students study chemical reactions through simulations. The data is analyzed, conclusions are drawn. The results of the project are presented and evaluated by the teacher and students.

Advantages of the design method. Students have the opportunity to apply their knowledge in practice. Encourages the development of new ideas. Through teamwork, communication and teamwork skills are developed. Students acquire knowledge not only by memorizing, but also by solving problems.

Examples of the design method in natural sciences

1. Biology: Topic: "The ecological role of local plant species." Task: Observe plants, take photos and prepare a report.
2. Chemistry: Topic: "Prepare environmentally friendly cleaning products at home." Task: Study the reaction of various chemicals and create a new product.
3. Physics: Topic: "Determine the efficiency of solar cells." Task: Assemble devices, analyze their efficiency.
4. Geography: Topic: "Distribution of water resources in Uzbekistan and their effective use." Task: Create maps and identify problems.

Evaluation criteria: The relevance of the project to the topic and the degree of achievement of the goal. The use of innovative approaches in the work process. The demonstration of students' knowledge and skills. The quality and logical consistency of the presentation. The project method allows students to engage in practical activities, not limited to obtaining theoretical knowledge. This method not only makes the educational process interesting and effective, but also forms students' independent problem-solving skills and prepares them for life.

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