

Performance Evaluation Method Biology Learning Project as An Effective Teaching Tool

Ulya Shirinzada Nijat

Institute of Education of the Azerbaijan Republic, Azerbaijan

Received: 02 Apr 2023; Received in revised form: 01 May 2023; Accepted: 07 May 2023
©2023 The Author(s). Published by TheShillonga. This is an open access article under the CC BY license
(<https://creativecommons.org/licenses/by/4.0/>)

Abstract

The purpose of this study is to investigate the effect of project-based learning and thinking ability in biology classes. The research analyzed a sample of students from two distinct grades using pre-test and post-test. Following that, the findings revealed that members of the experimental group I, which included students who engaged in project-based learning, had the best learning outcomes. In a project-based learning environment, students gained knowledge and skills by working collaboratively for an extended period on a real-world question or problem. Students trained using this model had better indicators of thinking ability than students trained using the traditional learning model. Thus, teachers must use the project-based learning model to guarantee better results while also improving students' thinking abilities to increase the model's efficacy. Schools can promote collaboration, agency, and effective communication skills by teaching social studies using project-based learning. PBL also allows students to address real-world issues in their community and around the globe.

Keywords— Project-based learning; Biology Education; teaching aids and methods; Education for secondary schools.

I. INTRODUCTION

The project technique of teaching evolved from pragmatism's philosophy. It is a life-situation-related experience-centered approach. The following principles underpin this teaching approach. The project method is presently very popular in the classroom. It can be used in any school topic where large-scale problems are solved, but it is best suited for middle and senior students. This necessitates a thorough introduction to the educational process, including: practice orientation, a focus on a specific result, a focus on a finished tangible product, a focus on social utility, the ability to use various educational spaces, the ability of participants in the educational process to be creative, and the ability to analyze the results at each stage of activity, relying on the previous one. The experience of the participants in the educational process, the possibility of synthesizing other types of activities, the possibility of a variety of sources of information, the opportunity to "try" oneself in various roles, the diversity of forms of organization of the educational process.

N.M. Verzilin and V.M. Korsunskaya's "Teaching Methodology of Biology" (1976) and O. Salahov's textbook of the "Teaching Methodology of Biology" (1984) were in Azerbaijan. Later, methodist M. Pagayeva's methodical recommendation "Methodology of using interactive teaching methods in the teaching of biology" published in

2003, as well as Z.B. Muradova and H.M. Hajiyeva's methodical manual "Possibilities of mutual teaching of chemistry and biology" published in 2004.

Biology is taught in two ways: general and special, and it is split into locations. The general methodology includes training pedagogical guidance, uniform material and methods, and their interaction. Plants, animals, man and his health, and general biology techniques are examples of special methods. Nonetheless, biological methodology is a unified discipline. (1. 6.) A biology teacher should understand not only the scientific substance of the subject, but also its methodology; a thorough understanding of biology teaching methodology is essential in educating the young generation and molding them into patriotic citizens. Only in this case, the methodology of teaching biology can have an effect according to the requirements of the time. Biological methodology has its own research object and specific feature. (2. 4-5)It differs from other methods. Formation and development of biological concepts in students' application of biological tasks and studies to be carried out is very important. Accordingly, assignments and studies that develop students' cognitive activity (ability), expand and deepen their knowledge, and serve to form general and specific concepts are not applied.

One of the most urgent tasks facing our schools today is to develop students' practical knowledge, skills and

habits. The rapid development of science and technology requires not only training, but also the improvement of its methods.

The biology curriculum has emerged as one of the measures made to implement Azerbaijan's education reform. This document, which summarizes the educational experiences of the world's developed nations, differs in its humanistic, democratic, and integrative nature, with a direct emphasis on the formation of students as individuals. (3. 6)The inclusion of content standards, training strategies, content, tools, and evaluation mechanisms demonstrates that it is also a complex document. The new biology content covers the most important knowledge and skills related to man, his health, his social nature, his connection with nature, and his psychological characteristics. The biology curriculum envisions the development of students' logical thinking, subject-related life skills, integration, progression from basic to complex, organization of the interaction of content and activity, and the use of new technologies in topic teaching. In general, teachers should plan or have existing learning resources in schools. (Carr, 2007; Carroll, 2012; Coe et al., 2014; Kohl et al., 2013). Most of the teachers have prepared and identified some types of learning resources that they are going to use for teaching by referring to lesson plans. Referring to the 2010 curriculum, teachers should use teaching resources to improve the quality of scientific knowledge in Azerbaijan republic. According to the observation results (February 2018), all biology teachers attempted to acquire and use teaching resources in each study session. Learning resources can be media from the school or media created by teachers, or they can be any situation connected to the learning environment. In actuality, however, not all accessible learning resources covered the intended material. As a result, teachers had to be more creative in their use of teaching tools. One potential solution would be to instruct students independently create their own learning resources in a group setting after conducting a thorough examination of learning objectives, literature reviews, and learning needs. Today, the creative project-based method is widely accepted around the globe, and a wide range of organizations and businesses, including schools, businesses, and government agencies uses it effectively. The model is adaptable; it can be used both long and short term, and it can be easily adapted to specific circumstances. In the classroom, biological concepts, worldview, thinking, practical knowledge, and skills are primarily formed. Because subjects and discussions are taught in a specific order and system during the teaching process. We all know that its forms and methods determine the standard of education. In the conditions of active use of creative thinking in the acquisition of knowledge, modern teaching methods used in the lesson guarantee students'

autonomous acquisition of knowledge, their formation as individuals, and the efficacy of result-oriented learning. The best method to make a project look nice is to keep it clean.(4. 5-9) The students keep it as clean as possible, particularly when gluing, and make sure their lines are straight. When they are finished, they can embellish their creation with colored fonts, glitter, and other embellishments. Less is more; if the students go overboard, their project will appear sloppy.

II. METHOD

Scientific research is carried out by the experimental research method. This method is a technique for gathering information and data on a topic by observing it in controlled environments. Understanding the advantages of experimental research design can help us use it more effectively in our work life. Pilot studies should begin with an examination of the function being evaluated, the learning environment, and the characteristics of the students. (Özcan, 2007) As a result, the properties to be evaluated in the study were chosen first and foremost based on the study's purpose.

III. PREJECT BASED INSTRUCTIONS IN THE AZERBAIJAN SCHOOLS

Project-based learning (PBL) or project-based instruction is an instructional strategy that allows students to build knowledge and skills through engaging projects based on real-world challenges and problems. Project-based learning, like all classes, necessitates extensive preparation and planning. It all starts with an idea and an important query. It is crucial to note that many content standards will be addressed when designing the project and the essential question that will launch the activities. Create a plan that incorporates as many topics as possible into the project while keeping these standards in mind.

The educator used the **essential question** to begin the instruction. The topic that will kick off a PBL lesson must be one that will engage his or her students. It is bigger than the job at hand. It is unfinished business. It will present a problem or a situation that the students can address, understanding that there is no single answer or solution. Begin an in-depth investigation of a real-world subject. Make your question about a real-life situation or subject. Choose a question about an issue that students will think they can influence by answering. Make it pertinent to them. The topic should be one that is relevant to your students' lives right now.

The second stage is **to plan the procedure**. It is critical to consider which content standards will be addressed when planning the project. Involve the students

in the planning process; when they are actively involved in decision-making, they will experience ownership of the undertaking. Choose activities that support the topic and make use of the curriculum to fuel the process. Include as many topics as feasible in the project. Determine what materials and resources will be available to students to help them. Prepare to delve deeper into new subjects and issues that emerge as students become more engaged in the active pursuit of solutions.

Making a Schedule is the next stage. Create a schedule for the project's components. Recognize that timetable changes will occur. Be adaptable, but help students understand that there will come a moment when they must finalize their thoughts, findings, and evaluations. When making a plan, keep the following points in mind: The teacher must be familiar with the program and completely familiar with the guidelines. Even though it appears that, the kids are doing all of the heavy work, there is a lot of planning that goes on behind the scenes to ensure that the work is available for them.

Allow for achievement by employing the following strategies:

- Assist pupils who may not be aware of time constraints.
- Set goals and objectives.
- Give pupils guidelines for time management.
- Teach them how to plan their duties.
- Remind them of the schedule.
- Assist them in setting goals.
- Maintain a simple and age-appropriate essential query.
- Initiate initiatives that will allow all students to succeed.

Allow students to explore new interests, but guide them when they look to stray from the project. When a group appears to be heading in a different direction, ask the students to explain their rationale. They might have an idea for a remedy you have not considered. Help the kids remain on track, but do not limit them unintentionally.

Now the teacher can **monitor** the students and the project's progress.

Follow these steps to retain control while allowing students to take responsibility for their work:

- Facilitate the learning process and the enjoyment of learning.
- Teach your pupils how to collaborate.
- Assign individuals of the group to roles that are fluid.
- Allow students to choose their primary responsibilities, but expect them to take responsibility and participate in all group roles.
- Remind them that every step of the process pertains to each individual and requires full participation from each student. Provide tools and direction.
- Create team and project rubrics.

Students may need to remain organized, track their progress, and keep a focus on the problem rather than becoming confused by its elements as the number of ideas to consider or procedures to follow increases.

Team rubrics outline each team member's responsibilities: Keep an eye on the group relationships. How active are the participants? How involved are they in the procedure? Examine the result. Rubrics for projects, on the other hand, pose the following questions:

What do the students need to complete the project?

What is the result: Is it a document? What about a video presentation? Is it a poster? A merchandise combination? What constitutes a successful report, multimedia presentation, poster, or other product?

The teacher makes the requirements plain to the students so that they can all succeed.

In the study's experimental design, the control group used the curriculum and course materials according to the "Current Curriculum Application," while the experimental group used the curriculum and course materials according to the "Project Approach to Learning." The biology teacher led the control and experimental groups during the research. Together with the biology teacher, the researcher actively participated in the experimental group, supervised the students in the projects they created in this topic, and supervised the students as needed. Before and after the research, students in the control and experimental group's teacher gave an achievement test in the subject "Cage." The scheme of the experiment used in the study is presented in Table 1.1.

Table 1.1. Experimental sample used in research

Group	Pre- test	Experimental part	Post- test
CG	BAT	Traditional teaching (TT)	ТДБ
EG	BAT	Project-base teaching (PT)	ТДБ

CG: Control group in which the current curriculum is applied

EG: An experimental group that uses a project-based approach to learning.

BAT: Biology achievement test.

The means of correct pretest answers, standard deviations, and t-test results calculated to determine if there is a significant difference between these scores in Table 1.2.

Table 1.2. Arithmetic mean, standard deviation and T-test results of students in the control and experimental groups, calculated based on the number of correct answers in the preliminary test.

Test Group	Question Number	S	S.D	T	P	Result
CG pre-test	40 \bar{X} 11,76	4,04				No difference between group means
EG pre-test	40 11,81	3,79				
			14	-0,06	0,953	

As a result of statistical analysis, the average number of correct pre-test correct answers of students in the control group was 11.76; On the other hand, the average number of correct answers in the experimental group was 11.81. Since $p = 0.953 > 0.05$ at the 95% significance level, it was concluded that there was no significant difference between the number of correct answers before the test by students in both groups. When looking at student scores on their personal information forms and the average number of correct answers on the pre-success test, it was observed that both groups were equal.

The subject of study was selected from the 7th class subdivision "Cell, organism, and metabolism." A biological achievement test for the topic of cells was developed based on the scale of the subject chosen for study and putting expert opinions into consideration. Prior to the commencement of the study, two equal classes were determined based on the biology teacher's opinion. This class's pupils were given the "Personal Information Form." After informing the students in the experimental group, the students were divided into heterogeneous groups based on their course success and the biology teacher's view. Lessons were conducted with students of the experimental group using methods, techniques and activities that correspond to the project-based approach to learning. The students in the experimental group co-created various projects according to the sub-themes determined each week for the subject of the

cell. During the creation of projects, students were guided by both the researcher and the biology teacher so that students could use textbooks, magazines, the Internet and the laboratory. Students who completed research on the project were also asked to present their products to all students in the class. Cell of subjects of the control group; It was applied by methods such as lecture, question-answer and discussion. The study was conducted twice a week (2x45) for six weeks in both groups (6x90). During this period, the successful application time before and after testing is not included in the course hours. Cell of subjects of the control group; It was applied by methods such as lecture, question-answer and discussion. The study was conducted twice a week (2x45) for six weeks in both groups (6x90). During this period, the successful application time before and after testing is not included in the course hours. At the end of the study, which was conducted for six weeks, the same "Biology Achievement Test" was administered to both the control and experimental students as a post-test. According to the information obtained from the data collection tools, the necessary statistical analysis was first carried out and the results were interpreted.

IV. CONCLUSION

Students work on a project that engages them in solving a real-world issue or answering a complex question over a prolonged period ranging from a week to a semester.

They demonstrate their knowledge and abilities by creating a public product or giving a presentation in front of a live crowd. As a result, students gain in-depth understanding of the subject matter as well as critical thinking, collaboration, creativity, and communication skills. Project-Based Learning instills in students and instructors a contagious sense of creativity. The desired outcomes of project-based learning can differ greatly depending on the school, teacher, and institution. However, project-based learning goals aren't all that dissimilar to the characteristics and benefits outlined above.

The project-based learning objectives are autonomous learning promoted through independent investigation of unstructured issues. Teamwork helps pupils prepare for social situations. Students are encouraged to see beyond their own ideas and information through self-evaluation and self-criticism.

REFERENCES

- [1] M.S.Babayev, M.M.Macidov: Biologiyanın tadrisi metodikası. Ali məktəblər üçün dərs vəsaiti Bakı, (NURLAN, Naşriyyat-Poliqrafiya Mərkəzi, 2005, 184 sah.
- [2] Azərbaycan Respublikası təhsil inkişafı üzrə Dövlət Strategiyası // 24 oktyabr 2013 Azərbaycan Respublikasının Prezidentinin 2013-cü il 24 oktyabr tarixli nömrəli Sərəncamı ilə təstiqlənmişdir – Bakı: Sərəncam - s.5
- [3] Azərbaycan Respublikasının Təhsil Haqqında Qanunu http://www.e-qanun.az/alpdata/framework/data/18/c_f18343.htm
- [4] Azərbaycan Respublikasının ömürboyu təhsil üzrə Milli Kvalifikasiyalar Çərçivəsinin təstiqlənməsi barədə Azərbaycan Respublikası Nazirlər Kabinetinin qərarı
- [5] Azərbaycan Respublikasında ümumi təhsil Milli Kurikulumu (layihə) “Azərbaycan müəllimi” qəzeti, 03 fevral Bakı, - 2006. - s. 130-150
- [6] Биология 7 класс учебник. - Баку, - 2014 год
- [7] Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. The Clearing House, A Journal of Educational Strategies, Issues and Ideas 83(2), 39-43. <https://doi.org/10.1080/00098650903505415>
- [8] Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning. Educational Psychologist, 26(3-4), 369-398. <https://doi.org/10.1080/00461520.1991.9653139>