ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23
American Academic publishers, volume 6, issue 01,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

METHODOLOGY OF USING PROBLEM-BASED LEARNING TECHNOLOGIES TO ENHANCE STUDENTS' CREATIVITY IN NATURAL SCIENCE LESSONS IN PRIMARY SCHOOLS

Ochilova O'g'iloy
A masters student of the Faculty of Pedagogy,
Samarkand State Pedagogical Institute

ANNOTATION

This article provides a scientific and methodological analysis of the role and effectiveness of 0-based learning technologies in developing creativity among primary school students during natural science lessons. The processes of creating problem situations, asking inquiry-oriented questions, drawing conclusions based on experiments and observations, and conducting analysis are considered key factors in developing students' creative thinking, independent decision-making, and problem-solving skills. The research results indicate that purposeful use of problem-based learning technologies significantly increases the level of creativity among primary school students.

Keywords

creativity, problem-based learning, natural science, primary education, creative thinking, pedagogical technology, inquiry, observation.

INTRODUCTION

Today, one of the main objectives of the education system is to guide students toward independent thinking and to develop their creativity and critical thinking skills. In the decrees of the President of the Republic of Uzbekistan on improving the quality of education, the effective use of modern pedagogical technologies—particularly problem-based learning methods—is identified as an important factor.

In the process of introducing primary school students to natural phenomena, living organisms, and their characteristics, a creative approach is required. Creating problem situations in natural science lessons encourages students to observe independently, make assumptions, and engage in inquiry. As a result, creative thinking is formed, knowledge is reinforced, and practical skills are developed.

This article analyzes the role and effectiveness of problem-based learning technologies in this process based on scientific principles.

MAIN PART (DISCUSSION AND RESULTS)

1. Goals and Objectives of Natural Science Lessons in Primary Schools

The main goal of natural science lessons is to form initial concepts and perceptions of nature in students and to develop skills such as observation, comparison, analysis, and generalization. The primary school period is the most active stage for the development of creative thinking, as students demonstrate a strong natural curiosity.

The use of problem-based learning technologies makes this process more engaging, effective, and creativity-oriented.

2. Theoretical Foundations of Problem-Based Learning

Problem-based learning is a technology based on creating a problem situation in the learning process that stimulates students' independent thinking and directs them toward solving the problem. This technology relies on the following principles:

creating problem situations;

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encouraging students to conduct inquiry;
proposing hypotheses (assumptions);
conducting experiments based on scientific evidence;
drawing conclusions;
evaluating results.

This process develops key components of creativity, such as flexible thinking, innovative approaches, and the ability to find quick solutions.

3. Practical Methods of Creating Problem Situations

The following methods are considered effective for creating problem situations in natural science lessons:

3.1. The "Why?" Method

The teacher conceals the cause of a natural process and encourages students to investigate it.

For example: "Why does snow turn into water when it melts?"

3.2. The "Finding Solutions Through Experiment" Method

Students observe phenomena through experiments and solve problems independently.

For example: demonstrating the evaporation of water through a practical experiment.

3.3. The "Unexpected Situation" Method

Students encounter an unfamiliar phenomenon and attempt to determine its cause.

3.4. The "Observation Diary" Method

Students find answers to problem-based questions based on weekly observations.

4. Problem-Based Tasks that Promote Creativity Development

The following tasks significantly enhance creativity:

Proposing hypotheses about natural phenomena:"How would plants grow if there were no wind?"

Comparing different natural processes:"What are the differences between evaporation and freezing of water?"

"What might happen?" games.

Mini-project activities: "Observe daily weather changes and create a graph.

These tasks develop flexible thinking, analytical skills, and creative hypothesis-making abilities in students.

5. Experimental Work and Its Results

As part of the research, a comparison was conducted between a class where natural science lessons were taught using problem-based learning (experimental group) and a class where traditional teaching methods were applied (control group).

The results showed that:

The creativity level of students in the experimental group increased by 27–35%;
Independent thinking skills improved significantly;
Interest in lessons increased;
Students began asking more questions;
Problem-solving abilities were well developed.

These results confirm that problem-based learning technologies are highly effective in primary education.

Table 1. Main Stages of Problem-Based Learning Technologies

№	Stage Name	Content	Practical

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			Application in the Lesson
1	Creating a problem situation	Stimulating curiosity and inquiry	Asking questions
2	Proposing hypotheses	Students formulate assumptions	Collecting possible answers
3	Inquiry and experimentation	Practical problem-solving	Conducting experiments
4	Drawing conclusions	Interpreting results	Summarizing outcomes
5	Evaluation	Analyzing results	Assessment

Table 2. Creativity Skills

No.	Creativity Skill	Description	Manifestation
1	Flexible thinking	Finding multiple solutions	Provides 2–3 reasons
2	Originality	Generating unusual ideas	Suggests innovative methods
3	Analysis	Comparison and evaluation	Explains processes
4	Hypothesis formulation	Making scientific assumptions	Expresses predictions
5	Problem-solving	Finding and justifying solutions	Draws conclusions

Table 3. Results of Experimental and Control Groups

Indicator	Experimental Group (%)	Control Group (%)
Independent thinking	+32%	+8%
Question-asking activity	+28%	+6%
Experimental skills	+35%	+10%
Completion of creative tasks	+30%	+9%
Problem-solving ability	+27%	+7%

CONCLUSION

Problem-based learning technologies are considered one of the most effective methods for enhancing students' creativity in natural science lessons. Such lessons, which encourage

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learners to explore, experiment, and observe, broaden their thinking horizons, develop independent decision-making skills, and foster creative thinking.

The results of the study revealed the following pedagogical advantages of problem-based learning:

it develops creative thinking;
it increases students' interest in the learning process;
it forms the foundations of scientific thinking;
it strengthens skills of observation, analysis, and drawing conclusions;
it enhances the effectiveness of natural science lessons.

Therefore, in organizing natural science lessons in accordance with modern educational requirements, it is necessary to regularly use problem-based learning technologies.

REFERENCES

1.Karimov, I. A. High Spirituality is an Invincible Force. Tashkent: Ma'naviyat, 2008.Resolution of the President of the Republic of Uzbekistan No. PQ–3775, 2018.
2.Xodjayeva, N. Methodology of Primary Education. Tashkent: O'qituvchi, 2020.
3.G'ulomov, A., & Mamarasulov, X. Pedagogical Technologies and Pedagogical Mastery. Tashkent: Fan, 2019.
4.Dewey, J. How We Think. Chicago: D.C. Heath & Co., 2015.
5.Bruner, J. The Process of Education. Harvard University Press, 2009.
6.Vygotsky, L. S. Mind in Society. Harvard University Press, 1978.
7.Akbarov, T. Methodology of Teaching Natural Sciences. Tashkent: Noshir, 2021.