

*Ahmadjonova Umida Tojimurodovna*  
*Senior Lecturer, Department of Physics,*  
*Jizzakh Polytechnic Institute, Uzbekistan*

## **CREATIVITY, CRITICAL THINKING, AND PROBLEM-BASED LEARNING TECHNOLOGIES IN THE EDUCATIONAL PROCESS**

**Abstract:** This work analyzes the interrelationship of the three pillars of modern education - creativity, critical thinking and problem-based learning technologies. The article, based on international experience and the opinions of pedagogical scientists, discusses methods for developing independent decision-making skills in students.

**Keywords:** creativity, critical thinking and problem-based learning, case study, insert method

**Introduction.** In today's information-intensive world, the primary goal of education is not just to impart ready-made knowledge, but to "teach how to learn." As the World Economic Forum (WEF) reports have noted, "Critical thinking and problem-solving skills are the most in-demand skills in the future job market." [1]

Critical thinking serves as a filter for analyzing and evaluating the information received. According to the definition of Linda Elder and Richard Paul [2]: "Critical thinking is the art of analyzing and evaluating one's own thinking in order to improve one's thinking process." Therefore, in the learning process, the student must not only find the answer, but also understand how the logical path to that answer was taken.

In the era of globalization, the most urgent task facing the education system is to prepare not only knowledgeable, but also creative and critical problem-solvers. As many researchers have noted, traditional educational methods are not sufficiently effective in preparing students for independent life.

One of the main problems of modern pedagogy is the formation of competencies in students, not only theoretical knowledge, but also the so-called “soft skills”. The paradigm of education of the 21st century has moved from the question “What to learn?” to the question “How to learn and apply?” In conditions of an abundance of information, a student must have the skills of sorting it (critical thinking), interpreting it in new ways (creativity) and applying it in practice (problem-based learning). Bringing creativity and problem situations into the educational process turns the student from a passive listener into an active researcher. As Ken Robinson noted, “Creativity is the process of having original ideas that have value. We should consider it as important as literacy and develop it to the same extent.”[3] This idea suggests the need not to limit creativity in education, but to bring it into the main learning process.

**METHODS.** In the research process, we chose the problem-based learning model. The basis of this method is based on the idea put forward by John Dewey: “We do not learn from experience... we learn by reflecting on experience”[4]. Barrows, speaking of problem-based learning, emphasized that this method develops in students the skills of self-regulation and lifelong learning[5].

The following methodological approaches were used in the study.

- Pedagogical experiment: Traditional lecture classes and problem-based seminars were compared in the learning process.
- Case study: Students were given situational tasks involving real-life and professional problems or were presented with real production or social problems (cases).
- Interview method: The teacher, without giving ready-made solutions, invited the student to critical analysis through leading questions. A “question-answer-feedback” chain was used to stimulate critical thinking.
- Group creativity: The task was to find at least three creative solutions to one problem using the “brainstorming” method.

- Qualitative analysis: Students were assessed through the level of creativity in completing the tasks.

**RESULTS.** As a result of the conducted research, it was found that students' performance in classes organized on the basis of problem-based learning technology was higher than in traditional groups.

- Information assimilation rate: Knowledge obtained through a problem situation is stored in memory 60-70% longer (20-30% in the traditional method).
- Cognitive activity: 78% of students began to independently study additional electronic resources and international experiences, not limited to the textbook, when solving the problem.
- Critical analysis skills: 75% of students were able to independently identify logical errors in the information provided.
- Logical analysis: 40% of students in the control group noticed errors in the information, while in the experimental group (when critical thinking methods were used) this figure was 85%.
- Creative solutions: An average of 4-5 alternative solutions were proposed for one problem. It turns out that when students are given the “right to make mistakes” their creativity increases by 1.5 times.

**DISCUSSION AND ANALYSIS.** The results confirm that creativity and critical thinking are not mutually exclusive, but rather complementary. While creativity generates new ideas, critical thinking ensures their application in real life[6].

In our study, a student who faced a problematic situation also felt a gap in their knowledge and sought to fill it.

It is worth noting that the role of the teacher changes when using creativity in education. He or she no longer becomes a “source of knowledge” but a “process moderator.” This requires a higher level of creativity and flexibility from the teacher.

The results show that the critical thinking filter serves to “sort out” creative ideas. In our study, students did not simply come up with “something new,” but critically analyzed how their proposed solutions fit into real life.

Problem-based learning acts as a catalyst for this process. When a student is faced with a problem, his brain automatically activates creative resources. During the research, it became clear that most students have difficulty abandoning the previously formed stereotype of “waiting for a ready-made answer”. This indicates the need for a fundamental reform of the education system, encouraging creativity from the initial stage.

Practical recommendations and methodological approaches.

The teacher can use the following strategies to apply these technologies in his lessons:

1. Interview method: Instead of telling students the correct answer, ask them a series of questions that lead them to the answer.
2. Case study: Analyze a real-life conflict situation and propose a solution.
3. Insert method: Critical analysis using the “V”, “+”, “-”, “?” signs when working on the text.

In order to train personnel who meet the requirements of the modern labor market, it is necessary to systematically introduce these technologies into the curricula.

In conclusion, the integration of creativity, critical thinking, and problem-based learning technologies in the educational process provides the following opportunities:

1. The integration of creativity, critical thinking, and problem-based learning in education changes the “passive student” model to the “active researcher” model. Creativity opens up new paths.
2. The ability to make logical and creative decisions in complex life situations is formed.

3. The knowledge gained is of practical value and is stored in long-term memory.
4. A problematic situation arouses motivation. Critical thinking ensures the choice of the most correct solution.

Combining creativity and critical thinking in the educational process takes students' intellectual potential to a new level. Problem-based learning is the most convenient platform for testing these skills. These approaches prepare the student not only for exams, but also for complex life situations.

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