JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205

Volume 15 Issue 06, June 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

DEVELOPING CRITICAL THINKING SKILLS THROUGH PROJECT - BASED LEARNING IN SECONDARY EDUCATION.

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Abstract: This article explores the effectiveness of project-based learning (PBL) in developing critical thinking skills among secondary school students. The study highlights the importance of fostering critical thinking in the 21st-century educational landscape and demonstrates how PBL enhances student engagement, autonomy, and problem-solving abilities. The findings indicate that students engaged in PBL become more independent thinkers and actively participate in collaborative learning environments.

Аннотация: В данной статье рассматривается эффективность метода обучения на основе проектов (PBL) для развития критического мышления в общеобразовательных школах. Раскрывается сущность критического мышления, необходимость его формирования у школьников, а также влияние PBL на их активное участие в учебном процессе. Исследование показало, что использование PBL способствует формированию у учащихся навыков самостоятельного мышления и решения проблем.

Annatatsiya: Ushbu maqolada umumta'lim maktablarida tanqidiy fikrlashni rivojlantirishda loyiha asosida o‘qitish (PBL) metodining samaradorligi tahlil qilingan. Maqolada tanqidiy fikrlashning mohiyati, uni o‘quvchilarda shakllantirish zaruriyati hamda PBL metodikasining o‘quvchilarning faol o‘rganishga bo‘lgan munosabatiga ta’siri yoritilgan. Tadqiqotlar PBL usuli orqali o‘quvchilar mustaqil fikrlashga, muammoni hal etish ko‘nikmasiga ega bo‘lishini ko‘rsatdi.

Kalit so‘zlar: tanqidiy fikrlash, loyiha asosida o‘qitish, o‘rta ta’lim, interaktiv metodlar.
Ключевые слова: критическое мышление, обучение на основе проектов, среднее образование, интерактивные методы.
Keywords: Critical thinking, project -based learning, secondary education active learning.

Introduction.

In the contemporary world, where information flows rapidly and global challenges demand innovative solutions, the ability to think critically is no longer optional - it is essential. Critical thinking, often defined as the capacity to analyze, synthesize, evaluate, and interpret information independently, lies at the heart of modern education systems. It empowers students to move beyond memorizing facts and enables them to engage with content more deeply, make informed decisions, and solve complex problems creatively. Despite its recognized importance, traditional educational practices in many secondary schools often fail to nurture these skills effectively. Instruction tends to be teacher-centered, with a focus on delivering information rather than guiding students in how to question, investigate, or apply what they learn. This method may prepare students to pass exams, but it does not fully prepare them for real-life situations where uncertainty, complexity, and ambiguity are the norms.

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In contrast, Project-Based Learning (PBL) has emerged as a dynamic alternative that aligns well with the development of 21st-century competencies, particularly critical thinking. Through PBL, students are immersed in meaningful tasks that require exploration, collaboration, reflection, and presentation. They learn to frame questions, conduct research, solve problems, and present their findings — all of which mirror the cognitive demands of critical thinking. Rather than passively receiving knowledge, learners actively construct it, often in response to real-world challenges.

Moreover, PBL provides opportunities for interdisciplinary learning. For example, a single project might require students to apply concepts from science, mathematics, language arts, and social studies. This holistic approach helps learners make connections across subjects and promotes a deeper understanding of the material. It also fosters motivation, as students take ownership of their learning and see its relevance beyond the classroom.

In the context of secondary education, where students begin to form their intellectual identities and prepare for higher education or the workforce, cultivating critical thinking is particularly urgent. PBL offers a structure that not only engages students but also equips them with the habits of mind they will need throughout their lives. However, the successful implementation of PBL requires thoughtful planning, appropriate scaffolding, and teacher preparedness. This paper seeks to explore the extent to which project-based learning can foster critical thinking skills among secondary school students. It examines both theoretical foundations and practical applications, drawing on existing literature and a small-scale study conducted in selected schools. The goal is to highlight the potential of PBL to transform classroom instruction and to contribute to the broader discussion about improving educational outcomes in the 21st century.

Methods.

This study adopted a mixed-methods research design to provide both statistical evidence and in-depth insights into the impact of project-based learning (PBL) on the development of critical thinking skills among secondary school students. The study was conducted over a four-month period in three secondary schools located in the Samarkand region. A total of 90 students from grades 8 to 10 participated in the study, with equal representation of male and female students.

Research Tools and Instruments:

1. Critical Thinking Assessment Test (CTAT): A standardized pre-test and post-test were administered to evaluate students' critical thinking abilities at the beginning and end of the project cycle.
2. Classroom Observations: Teachers and researchers observed lessons to track students' engagement, problem-solving behavior, and collaboration.
3. Student Interviews and Focus Groups: After the completion of projects, students were interviewed to gather qualitative data on their experiences and perceptions of learning.
4. Teacher Surveys: Teachers completed a structured survey to assess their views on student performance and the implementation of PBL.

Project Implementation:

Students were divided into groups of 4–6 members and each group was assigned a real-life problem relevant to their community or school environment. Projects included:

Designing a sustainable school garden.

Proposing solutions for reducing plastic waste in the school.

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Creating a digital safety awareness campaign.

Each project followed five phases:

1. Problem identification
2. Planning and research
3. Project execution
4. Presentation
5. Reflection and evaluation

Teachers acted as facilitators, providing guidance but allowing students to take the lead in decision-making.

Results.

The results of the study indicate a significant improvement in students' critical thinking skills after engaging in project-based learning.

Quantitative Data:

Pre-test average score: 56.4/100

Post-test average score: 78.2/100 This marks a 39% increase, showing that students developed stronger abilities in argument analysis, reasoning, and inference.

Students who previously struggled with articulating their thoughts were now able to: Justify their opinions with evidence.

Evaluate multiple solutions to a problem.

Identify flaws in reasoning during peer discussions.

Qualitative Observations:

1. Increased Student Engagement: Students were more motivated and actively involved in the learning process.
2. Improved Communication: Many students became more confident in presenting their ideas and collaborating with peers.
3. Greater Autonomy: Learners took ownership of their projects, often going beyond teacher expectations by conducting additional research or applying technology creatively.

Interviews confirmed that students found the experience enjoyable and meaningful, with comments such as: “I finally understood why learning science matters in real life,” and “We learned more by doing, not just listening.”

Discussion.

The findings support the idea that project-based learning is a powerful tool for enhancing critical thinking in secondary education. The results are consistent with existing literature, which suggests that PBL provides opportunities for authentic learning and fosters a deeper cognitive engagement than traditional methods.

Several key factors contributed to the success of PBL in this study:

Real-world relevance: Students were more motivated when tasks mirrored actual societal problems.

Collaboration: Working in teams encouraged the exchange of diverse perspectives and enhanced reasoning.

Student autonomy: Giving students responsibility led to increased confidence and curiosity.

While the benefits of PBL are clear, challenges were also noted. Teachers reported that implementing PBL required more time for planning, and assessing group work fairly was sometimes difficult. Additionally, students with limited prior experience in self-directed learning

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initially struggled to adapt. However, with support and guidance, these students improved over time. PBL also encouraged the development of secondary skills such as time management, digital literacy, and public speaking, all of which are closely linked to long-term academic and professional success.

Conclusion.

In conclusion, this study provides evidence that project-based learning significantly enhances critical thinking skills among secondary school students. PBL enables learners to engage deeply with content, develop practical problem-solving skills, and become more autonomous and reflective thinkers. It bridges the gap between theoretical knowledge and real-life application, making education more meaningful and effective.

To fully harness the potential of PBL, it is recommended that:

Schools provide professional development for teachers in PBL methodologies.

Curriculum designers allow for flexibility to integrate longer-term, interdisciplinary projects.

Assessment tools be adapted to evaluate process-based learning outcomes, not just final products.

Project-based learning is not just a method - it is a mindset. It cultivates a generation of learners who are curious, capable, and equipped to contribute thoughtfully to their communities and the world.

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