Developing Critical and Reflexive Thinking in High School Students through Project-Based Learning Case Study Snthesis

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ABSTRACT

Project-Based Learning (PBL) is not just an educational approach, it's an effective preparation for life. Through solving real-life problems, students are not passive learners. They learn to think critically and reflectively. This article examines in detail how PBL prepares high school students, particularly those enrolled to courses of pedagogy and psychology, to be considerate, skilled students and future teachers. From international observations to school situations in Romania, this article investigates what teachers can do to produce deeper, integrative, and consequential learning.

Key-words: Critical thinking; PBL (Project-Based Learning); pedagogy classes; psychology classes; reflexive thinking.

INTRODUCTION

Critical thinking creates a frame in which students can evaluate information and make informed decisions, while reflexive thinking requires them to examine their own beliefs, biases, and learning processes. In a complex world, these abilities are more than important. They are crucial among prospective teachers and caregivers, in particular. Reflexive thinking complements but is not at all the same as critical thinking; it interrogates the "filter" through which we do both learning and teaching. In contrast to memorization or other traditional teaching and learning methods, PBL puts students at the center of learning. It asks them to find solutions to real problems, to consult each other, and to reflect heavily. In this article, it is shown how PBL facilitate critical and reflexive thinking in the high school classrooms.

Theoretical Framework

To get a sense of why PBL works, it's valuable to look at learning theory like Bloom's and Fink's taxonomies. Both impose the need for active, valuable learning experiences. PBL is rooted in constructivist theory, so students learn best if doing research, working in teams, and solving problems. In Romania, educational reforms have made this kind of learning increasingly important, especially at the vocational high-school profiles, where future teachers will have to be reflective and adaptive.

Mechanisms of Development in PBL

Project-based learning can help students think critically and reflectively by guiding them in/to:

- Real Problems: Students engage in substantive, real-life issues that require responses deeper than surface.
- Group work/Teamwork: While working in groups, they listen, argue, and occasionally defend concepts, like real-life debates.
- Try and Try Again: Students learn to interpret feedback and revise by planning, testing, and adjusting.

- Sharing with Others: Working on presentations or products for real audiences causes them to think about communicating well and anticipating other people's reactions.

Classroom Applications

From my experience, teachers can bring PBL to life in psychology and pedagogy classes with hands-on, meaningful projects like:

- Classroom Management Toolkit: Students learn realistic classroom situations and design tools or guides to handle them.

- Cultural Awareness Campaigns: Students learn about stereotypes and societal problems, and design media or awareness campaigns to foster respect and empathy.

- Peer Teaching: Students develop and teach other teams about psychology principles, including child development stages, and consider what it's like to teach. Such activities inevitably involve questioning, reflection, and refinement- hallmarks of reflexive and critical thinking.

Assessment Strategies

In order to really get at how students think, we need something other than tests. These are some better options:

- Reasoning Rubrics: Detailed standards to evaluate to what extent students formulate arguments and support positions.

- Learning Journals: A space where students reflect on what they've learned, what challenges they encountered, and in what ways they've grown.

- Peer and Self-Assessment: Students evaluate peers and one's own tasks, making them self-aware and accountable.

Evidence from Research

Studies from around the world support the idea that PBL really does build deeper thinking. Meta-analyses show improvements in problem-solving, reasoning, and metacognition. In Romanian universities, students who worked on real-world, collaborative projects reported feeling more aware of their thinking and more prepared to apply what they learned.

Recent research supports the effectiveness of PBL across a variety of educational settings. A meta-analysis of 66 studies revealed that PBL significantly enhances academic achievement, especially in science, technology, engineering, and math (STEM) fields. Students also showed improved attitudes toward learning and stronger critical thinking skills. Notably, the impact was greatest when projects lasted between 9 to 18 weeks and involved teams of 4-5 students (Gómez Puente et al., 2023).

In large-scale studies conducted by the University of Southern California and Michigan State University, students in high school Advanced Placement (AP) classes who learned through PBL outperformed their peers on standardized assessments. These results were consistent across socio-economic backgrounds, underscoring PBL's potential to promote equity in education (McKenna et al., 2021).

However, effective implementation is key. Teachers play a critical role as facilitators, guiding students to engage deeply with content while maintaining academic rigor. Without intentional design and scaffolding, there is a risk that students may become engaged in activities without achieving meaningful learning outcomes (Harvard Graduate School of Education, 2022).

Organizations like PBLWORKS have outlined essential elements of high-quality PBL, often referred to as 'Gold Standard PBL.' These include a challenging problem or question, sustained inquiry, student voice and choice, critique and revision, and a public product. When these principles are in place, students not only master content but also develop the confidence and skills needed to thrive in future academic and professional environments (Larmer et al., 2015).

As educational landscapes continue to evolve, especially with the integration of technology and AI tools, PBL remains a dynamic and adaptable strategy. Recent innovations include collaborations between educators and researchers to co-design tools that support personalized and equitable PBL experiences using artificial intelligence (Parrish et al., 2025).

How Romanian Educators Are Using Project-Based Learning to Empower Students

In Romania, a growing body of research is revealing how project-based learning (PBL) is reshaping education, from high school to university. Teachers and researchers are finding that when students take on real-world projects, they don't just learn academic content, they become more motivated, engaged, and equipped with skills like collaboration, problem-solving, and critical thinking.

One of the most innovative uses of PBL comes from the" Dracula Digital" short-film competition. Conducted in 2022 and analyzed by Ling, Liu, and Nechiță (2024), this project brought together students from Romania and Brunei to create original short films. The researchers found out that the competition hit all the marks of quality PBL: students had a meaningful challenge (so they had to face a real-life problem), worked in teams, used their voices, and reflected on their work throughout the process. For many, it was their first experience transforming abstract classroom concepts into a tangible, creative product. The study concluded that film-based media projects can serve as powerful PBL experiences, especially in media and communication education.

At Ovidius University of Constanța, Munteanu and Zaharia (2023) wanted to hear directly from students. They surveyed undergraduates who had recently participated in project-based learning. The feedback was overwhelmingly positive: students said PBL made them feel more motivated and responsible, and it helped them solve problems more creatively. At the same time, many pointed out some barriers- especially a lack of resources and the need for more support from instructors. The findings suggest that while students value this type of learning, institutions need to better support its implementation to help it thrive.

A 2020 study by the RESTART4EDU project expanded the lens to include teachers from Romania, Portugal, and Turkey. It found that educators across these countries believed in the power of PBL, but many lacked training and practical experience. Interestingly, Romanian teachers reported receiving more institutional support for PBL than their Turkish counterparts, showing that while gaps remain, Romania is moving in the right direction (RESTART4EDU, 2020). The study underlines the need for continued professional development and collaboration across countries.

At the University of Bucharest, PBL has made its way into master's-level engineering courses. In a case led by Lazar and Faciu (2018), students tackled environmental problems through interactive simulations. These projects didn't just build technical skills, they also helped students become more self-directed and better at working in teams. The hands-on, problem-solving nature of the work gave students a deeper understanding of both the science and the impact of their actions. It's a strong example of how PBL can prepare students for complex, interdisciplinary challenges.

Finally, a 2025 ResearchGate case study documented how one Romanian university tried to improve its PBL courses over time. Faculty members identified the challenges they faced in early iterations- like unclear goals or uneven student engagement- and then adapted their approach. The result? More intentional project design, better student outcomes, and a deeper understanding of how to implement PBL in their specific context (2025). This study shows that PBL doesn't have to be perfect right away, it can be refined like any teaching method.

Together, these studies paint a hopeful picture for Romanian education. They show that when students are given meaningful, collaborative tasks, they rise to the occasion. And when teachers are supported in shifting to active,

student-centered learning, everyone benefits. Whether through film competitions, environmental simulations, or reflective teamwork, PBL is helping Romanian students and teachers alike become more engaged, creative, and prepared for the future.

Potential challenges of PBL

Ask any teacher who has tried to swap a tidy lecture for an open-ended problem and you'll hear a familiar sigh: *"Where does the time go?"*- because good PBL takes longer than a 50-minute period. Students need space to explore dead ends, and facilitators need pauses to coach instead of "telling". When the bell rings, you're often midway through the richest part of the discussion, and tomorrow's timetable is already full.

Then there's the silent countdown to high-stakes tests. Even the most progressive schools still publish grade averages, so teachers feel the tug of coverage: *Will my class know the formulas on the exam if we spend three days redesigning a rain-water system?* That tension can turn an otherwise vibrant project into a rushed checklist.

Finally, many of us simply weren't trained for this. New facilitators describe standing in front of a buzzing group, wondering whether to intervene or let the struggle play out. Without mentoring or sample rubrics, that uncertainty can slide into self-doubt and, eventually, a quiet retreat back to slide decks.

Acknowledging these very human pressures (limited minutes, external metrics, and the vulnerability of learning new roles), doesn't diminish PBL's value. It just reminds us that successful implementation needs breathing room in the schedule, assessments that reward process as well as product, and a supportive culture where teachers can practice coaching skills without feeling they're winging it alone.

CONCLUSION

PBL isn't another education trend- it's an extremely effective preparation for life. Through encouragement to investigate, to co-learn, and to reflect, we prepare students to be aware, analytical thinkers. For students who may one day become teachers, this method not only teaches content knowledge but models the type of learning to which they one day will teach. Done intentionally, supported in robust assessment, PBL converts classroom rooms to preparation grounds for leaders of tomorrow.

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