



Problem-Based Learning in Occupational Health & Safety: The Key to Fostering Critical Thinking and Creativity in Students

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Received: 12 July 2025

Accepted: 2 August 2025

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Please cite this paper as: Ebrahimi MH, Gharibi V. Problem-Based Learning in Occupational Health & Safety: The Key to Fostering Critical Thinking and Creativity in Students. Shahroud Journal of Medical Sciences 2025;11(2):57-58.

Letter to the Editor

The Occupational Health & Safety (OHS) sector holds critical importance due to its direct impact on public health and environmental sustainability. Consequently, training skilled and capable professionals in OHS management and occupational health and safety engineering—who can effectively tackle multifaceted and complex issues—is an undeniable necessity. However, traditional educational approaches, which predominantly emphasize theoretical knowledge transfer and rote memorization, fall short of meeting the dynamic and challenging demands of this field. In contrast, Problem-Based Learning (PBL) offers an active, student-centered approach grounded in real-world problems, providing an ideal framework for cultivating critical thinking and creativity—skills that are vital in the OHS domain.^{1,2}

Traditional teaching methods often confine students to passive information reception, insufficiently fostering practical skills and critical thinking. Meanwhile, OHS workplaces are characterized by complexity, uncertainty, and diverse challenges, requiring multidimensional competencies such as problem analysis, rapid and creative decision-making, and teamwork.¹ PBL actively engages students in the learning process, compelling them to identify, analyze, and devise solutions for authentic and complex problems. This approach increases learning motivation, deepens conceptual understanding, and develops essential skills including critical thinking, creativity, information retrieval, and collaboration. Research indicates that students trained through PBL perform better in complex and uncertain situations and are better prepared for the labor market.^{2,3} Internationally, universities such as Maastricht and McMaster have successfully integrated PBL into engineering, medical, and environmental science curricula, resulting in improved educational quality and enhanced professional competencies among students.^{1,4,5} These institutions leverage real-world cases and applied projects to stimulate creative and critical thinking, effectively preparing students to confront the multidimensional challenges inherent in OHS.

Despite its numerous advantages, the widespread and effective implementation of PBL in Iran faces several obstacles that require targeted attention:

Many instructors lack familiarity with PBL principles and methodologies. Specialized training programs and workshops are essential to enhance active teaching skills and guide student-centered learning.

Existing curricula are often rigid and traditional, limiting the integration of real-world and locally relevant challenges. Curriculum redesign with greater flexibility and project orientation is crucial for effective learning.

A predominant focus on memorization-based exams reduces students' motivation for deep learning. Developing assessment frameworks that emphasize analytical skills, critical thinking, and problem-solving can reinforce active learning.¹

Employing educational technologies such as Learning Management Systems (LMS), simulations, and interactive environments facilitates collaborative and active learning experiences.

Designing problems and projects tailored to the country's industrial, cultural, and environmental contexts enhances motivation and the practical relevance of learning.

Additionally, strengthening partnerships between universities, industries, and OHS-related organizations can foster the creation of applicable and localized educational content, exposing students to real and complex problems. Such collaborations not only improve educational quality but also boost students' professional readiness.

Conclusion

Problem-Based Learning is an effective approach for nurturing critical thinking, creativity, and professional competencies among students in OHS management and occupational health and safety engineering. By emphasizing active and collaborative learning within the context of real-world problems, PBL prepares students to face the complex and multifaceted challenges of the OHS field. Global success



stories affirm that integrating PBL into curricula enhances educational quality and better equips students for the workforce. To fully harness PBL's benefits in Iran, existing barriers—including insufficient specialized faculty training, traditional curriculum structures, ineffective assessment systems, and infrastructural limitations—must be addressed. Localization of educational content, the adoption of modern technologies, and enhanced university-industry cooperation are key strategies in this endeavor.

Ethical Considerations

Nothing to be reported.

Acknowledgment

Nothing to be reported.

Conflict of Interest

None to report.

Funding

Nothing to be reported.

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