Demystifying problem-based learning in teacher training curriculum: A systematic review

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This blog post emphasises our efforts as teacher educators in championing problem-based learning (PBL) and creating further awareness of its relevance in teacher education.

Problem-based learning is an effective pedagogical approach in educating medical students. It originated from McMaster University medical school in Canada in 1969 (see Servant-Miklos, 2019). Other fields are beginning to embrace this pedagogy such as engineering and business. However, its adoption across other subjects is underutilised, especially in teacher training programmes (Major & Mulvihill, 2018; Magaji et al., 2024).

Focusing on trainee teachers in secondary education, we examined the application of PBL through a systematic review of the literature on preservice science teachers' experiences and classroom implementation (Magaji et al., 2024; Turk & Seyhan, 2022). An initial search identified 1,352 studies, of which 10 empirical papers met the inclusion criteria.

Despite the well-documented benefits of PBL, we found limited attention given to preparing future science teachers to implement this approach effectively. For teachers, PBL supports the development of critical thinking, creativity and pedagogical content knowledge (Asy'ari, 2026). For students, it promotes deeper analysis, collaborative learning, critical thinking and the application of science to real-world contexts through inquiry-based problem solving and discussion (Loyens et al., 2023). These principles align closely with the 3C3R and K-ACT frameworks which conceptualise learning as a continuum in which learners acquire knowledge, collaboratively construct and refine understanding, and subsequently apply learning in new contexts. In doing so, the model further emphasises the development of critical thinking, collaboration, problem-solving and reflective learning.

Across our research, one theme emerged consistently: preservice science teachers often experienced uncertainty when first encountering PBL. They were unsure whether they could design or facilitate open-ended and inquiry-driven learning. This hesitation is unsurprising as implementing PBL effectively requires teachers to craft authentic problems, guide

collaborative inquiry, and shift from knowledge transmitters to facilitators of learning. As educators, we began to consider how teacher trainers could be better supported through modelling approaches to PBL and matching these with initial teacher training guidance.

Implementing problem-based learning effectively requires teachers to craft authentic problems, guide collaborative inquiry, and shift from knowledge transmitters to facilitators of learning. Our findings from this systematic review suggest that when preservice teachers are given structured training, opportunities to function as learners within a PBL environment and observe experienced teachers modelling it, they can develop their confidence in applying the approach. It was clear that experiencing PBL 'from the inside' appeared to be transformative and had enabled preservice teachers to grasp not only what PBL is but why it works and how they could implement it. PBL holds significant promise for developing the pedagogical skills and dispositions needed for contemporary science education. However, its potential is partially realised in teacher training due to lack of expertise in the literature. Therefore, preparing teachers for inquiry-rich, student-centred classrooms requires more than a brief introduction or workshop to PBL. It requires time, guided experience, supportive mentoring, and opportunities to observe, design, implement and reflect on PBL within authentic learning environments.

Moving forward, the narrative emerging from this systematic review highlights clear potential in providing trainee teachers with structured and repeated opportunities to engage with PBL rather than simply learning about the approach. Additionally, PBL frameworks could be adapted and critically evaluated to provide a strong foundation to build upon. Teacher educators, curriculum specialists and school-based mentors need to work collaboratively to ensure greater consistency between the university-based learning and school-based experience of PBL implementation.

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