

Problem-Based Learning Applied among Vocational Nursing Students: Current Status and Influencing Factors

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Abstract: Problem-based learning (PBL) is widely advocated in nursing education to promote clinical reasoning, collaboration, and self-directed learning, but evidence specific to vocational nursing students remains dispersed across designs and settings. Recent syntheses generally indicate that PBL enhances critical thinking compared with lecture-based approaches, and the gains tend to be stronger and more consistent when PBL is coupled with case-based learning or simulation activities aligned to realistic clinical tasks. Findings on problem-solving performance and confidence are heterogeneous, reflecting variations in measurement and implementation fidelity. Drawing on recent reviews and empirical studies, this paper narratively synthesizes the current status of PBL with attention to vocational contexts and explains how learner preparation, tutor facilitation, case authenticity, assessment design, institutional resources, and technology readiness shape outcomes. The paper then offers an integrated, practice-oriented account of how to stage PBL in time-constrained vocational programs—beginning with authentic triggers, scaffolding early self-directed inquiry, using short simulation “proofs of learning,” and assessing process and products together—before outlining gaps for future research.

1. Introduction

PBL structures learning around an authentic problem that activates prior knowledge, surfaces learning needs, and drives small-group inquiry toward a defensible plan of action, with a facilitator guiding but not dictating the reasoning process [1]. In nursing, this design aligns naturally with the cognitive and interpersonal demands of frontline care: realistic problems compel learners to integrate physiology, pharmacology, and patient preferences while negotiating roles and communicating decisions, thereby tightening classroom-to-clinic transfer and cultivating teamwork and communication that are central to safe practice [2]. Across the last several years, meta-analytic evidence has converged on a generally positive—though method- and measure-dependent—effect of PBL on critical thinking, strengthening the rationale for its adoption in pre-licensure curricula and suggesting that when facilitation is competent and cases are well structured, learners more reliably

articulate rationales, appraise evidence, and anticipate risks than under lecture-dominant formats [1,2]. What remains insufficiently understood, however, is the extent to which these benefits carry over to vocational cohorts who move through shorter instructional cycles, enter with more heterogeneous academic preparation, and must satisfy dense skills checklists alongside clinical placement requirements; in such settings, cognitive load, time pressure, and variable access to simulation or small-group spaces may attenuate gains unless early scaffolding, assessment clarity, and case authenticity are deliberately engineered. Clarifying which PBL design decisions consistently survive these constraints—such as compact trigger cases, brief “proof-of-learning” simulations, and process-plus-product assessment—motivates the present synthesis and frames its focus on what works, for whom, and under which resource conditions in vocational nursing programs [7,3].

2. Scope and Approach

This review focuses on peer-reviewed sources from 2019-2025 that examine PBL in nursing education and allied methods frequently paired with it, namely case-based learning and simulation [3]. Priority was given to systematic reviews, meta-analyses, and empirical studies with clear implementation detail or vocationally relevant samples, and evidence was read for convergent findings on core outcomes, plausible context effects, and recurring design choices preceding stronger results [1,2].

3. Current Status of Evidence

Across recent quantitative syntheses, PBL outperforms conventional lecture on measures of critical thinking, with effect estimates ranging from small to moderate depending on instrument and study quality [1,2]. Reviews also note that when PBL is embedded in richer environments—such as explicitly structured cases or short simulations used to enact portions of the plan—effect sizes are more stable and confidence in conclusions higher [3,4]. The most credible interpretation is not that PBL alone suffices, but that its inquiry cycle becomes more potent when learners must test their reasoning in a feedback-rich practice episode, a pattern especially pertinent to vocational cohorts given their procedural, time-bound curricula [3]. Findings on other outcomes are mixed. Problem-solving tests and self-confidence measures do not uniformly favor PBL, and heterogeneity persists even after grouping by level of study [1]. Differences in assessment targets and scoring practices likely account for part of the variance; process-sensitive rubrics capture growth in reasoning more faithfully than one-off knowledge checks, while product-only grading can obscure collaborative contributions, implying that evaluation strategy can be as influential as pedagogy [2]. Two streams of evidence further strengthen the vocational case. Studies that integrate PBL with simulation in ethically or communicatively demanding contexts report gains in moral sensitivity, empathy, and critical thinking, suggesting that realism and immediate practice consolidate otherwise abstract reasoning [4,8]. In Chinese higher-vocational settings and internship rotations, blended cooperative-project PBL designs have been reported to improve learning efficiency and critical thinking when tasks are calibrated to scope of practice and supported by concise resource packages [7]. Although these studies vary in rigor, their design features align with mechanisms inferred in meta-analyses [1,3].

4. Influencing Factors

Outcomes in vocational cohorts hinge first on student preparation and the early choreography of self-directed learning. Because prior academic foundations are uneven, the initial PBL cycles

benefit from structured pre-briefs that narrow the search space without pre-empting inquiry-clarifying key terms, suggesting trustworthy databases, and modeling how to turn a question into a tractable search strategy [2]. With such scaffolding, novices avoid cognitive overload and build confidence in sourcing and appraising evidence, after which the teacher can progressively withdraw support [1]. Tutor facilitation quality consistently emerges as a second determinant. Effective facilitators use probing questions to surface assumptions, ask for warrants for claims, and help students reconcile conflicting cues, while resisting the temptation to “lecture the answer” [1]. Qualitative work with nurse educators highlights practical obstacles-limited materials, variable student buy-in, non-standardized cases, and concerns about subjective grading-that can blunt impact when support and professional development are thin; addressing these barriers with concise case libraries, shared rubrics, and micro-coaching on debriefing talk has been associated with smoother adoption [5]. Curricular design interacts closely with assessment. Authenticity of cases, clear difficulty gradients, and vertical alignment across modules enable vocational learners to connect rationales to procedures, and when the PBL cycle culminates in a short simulation or role-play that “proves” the plan, students experience how decisions translate into actions [4]. Evaluative practices that combine process observations with product quality are better suited to capture this growth and mitigate free-riding in team settings, which helps explain why studies that use such rubrics report more consistent effects on reasoning than those relying only on end-point tests [2]. Institutional conditions matter as well. Class size, access to skills labs and simulation time, availability of small-group spaces, and the coherence between school-based scenarios and expectations in clinical placements modulate feasibility and credibility of PBL for vocational pathways [5]. While few studies isolate these variables experimentally, implementation reports repeatedly note that alignment with clinical partners and careful timetabling are decisive for sustaining PBL across a semester rather than as a one-off innovation [1]. Finally, technology readiness is not incidental. Students’ digital literacy, prior experience with learning management systems, and the availability of just-in-time training shape willingness to engage in technology-supported PBL [6]. As programs begin to experiment with large-language-model tools to scaffold question formulation, evidence search, or feedback drafting, a governed approach that treats AI outputs as provisional artifacts subject to verification-within clear academic-integrity boundaries-appears prudent for vocational cohorts [6].

5. Implementation in Vocational Programs

In practical terms, a vocationally responsive PBL session begins with a compact, workplace-authentic trigger-a triage vignette, a medication reconciliation puzzle, or a basic wound-care scenario-containing just enough data to invite competing hypotheses without drowning students in noise [4]. After a brief whole-class clarification of the task, small groups articulate what they think is happening and what they need to learn to decide. Early in the semester the facilitator models how to turn those needs into searchables-defining terms, choosing a database, and setting inclusion criteria-then steps back as students distribute roles for evidence-seeking, quality appraisal, synthesis, and reporting [1]. Rather than delivering a mini-lecture, the facilitator’s talk is mostly questions and requests for warrants-Which rationale best explains the trend? Which guideline grade supports the intervention? Where might the plan fail and why?-so that reasoning becomes public and coachable [2]. The group then presents a defensible nursing plan, and the session transitions into a brief simulation or role-play that enacts a critical slice of the plan, such as an SBAR handoff or a sterile field setup; the final minutes are reserved for debrief to compare intended actions with what the simulation surfaced and to capture lessons learned that travel to the next module [4]. This compact cycle, repeated with escalating complexity, fits vocational timetables and steadily builds both

reasoning and doing [3]. Assessment is folded into the flow. Early iterations emphasize low-stakes formative feedback on the reasoning process—how clearly the group specifies learning issues, cites and grades evidence, and makes trade-offs—so students learn what quality looks like before grades carry weight [2]. As competence grows, the product gains prominence through common rubrics for plan quality, risk anticipation, and communication performance, with transparent role rotation and occasional individual micro-vivas attached to group deliverables to anchor fairness [1]. When these practices are consistently applied, the variability seen in the literature on “problem-solving” outcomes diminishes, suggesting that clarity of measurement can be as influential as the pedagogy itself [3].

6. Gaps and Directions

The literature would benefit from randomized or strong quasi-experimental studies conducted specifically in higher-vocational nursing colleges and during clinical internship rotations, rather than predominantly in comprehensive universities or short-term skills workshops. Such designs are needed because students in vocational tracks often differ from university students in baseline academic preparation, clinical exposure, and perceived professional identity, meaning that findings from university samples may not transfer cleanly to practice-oriented settings. In these future studies, outcome variables should move beyond broad attitudinal self-reports and instead map directly onto job-ready competence. Examples include safe medication administration behaviors (e.g., adherence to the “five rights,” double-checking high-alert drugs, error reporting), aseptic technique planning and execution in routine but contamination-sensitive tasks (e.g., wound dressing, IV-line changes), and clarity, accuracy, and assertiveness in interprofessional communication when working under real- or simulated-time pressure. These are the kinds of behaviors that supervisors and employers actually judge in early-career nurses, and they are also the areas where preventable harm most commonly arises in entry-level clinical work [3].

Measurement consistency is another priority. At present, studies employ a wide mix of self-developed checklists, global satisfaction ratings, or generic critical-thinking questionnaires, which makes it difficult to compare effects across programs or to build cumulative evidence. Future work should incorporate validated, process-sensitive rubrics that are anchored in observable performance criteria (e.g., clinical reasoning steps, error anticipation, situational prioritization) and apply them in a structured way across time. Performance-based assessment tasks — such as scenario-driven medication handoffs, sterile field setup under observation, or SBAR-style team briefings during simulated deterioration — should complement global critical-thinking disposition or problem-solving scales. The goal is not to discard these broader scales, but to pair them with behavioral demonstrations so that we can detect where change actually occurs, at which stage of the clinical reasoning process it appears, and whether it endures beyond a single teaching block [2].

Finally, there is a practical question that matters to deans and training directors: what is “good enough” for routine teaching, given real staffing and budget constraints? Pragmatic trials that directly compare standard PBL with PBL plus brief targeted simulation (for example, adding a short high-fidelity scenario every two weeks) across realistic class sizes, typical faculty loads, and equipment profiles would generate decision-relevant evidence. Such head-to-head comparisons would clarify not only whether simulation produces incremental gains over PBL alone, but also how large those gains are, for which specific competencies, and at what marginal cost in terms of instructor hours, lab space, and consumable materials. Evidence of this kind would allow institutions to judge scalability and cost-effectiveness without having to overgeneralize from small, highly resourced pilot cohorts that may not resemble most vocational nursing programs [1].

7. Conclusion

For vocational nursing programs, the preponderance of recent evidence supports PBL as an effective engine for developing critical thinking, particularly when its inquiry cycle is anchored to authentic cases and culminates in short, feedback-rich simulations. Success depends on early scaffolding that tames cognitive load, facilitation that makes reasoning public, assessment that values both process and products, and institutional arrangements that keep cycles short and repeatable. With sharper measurement and vocationally situated trials, the field can move from promising patterns to reproducible practice at scale.

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