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Review

Importance of Project-Based Learning for Pharmacy Education

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Abstract:
Project-based learning (PBL) has emerged as a transformative approach in pharmacy education, supporting the development of practice-ready graduates capable of delivering comprehensive pharmaceutical care. This review synthesizes empirical evidence published between 2020 and 2025 demonstrating that PBL significantly enhances learning outcomes, clinical reasoning, interprofessional collaboration, and professional competencies aligned with accreditation standards and contemporary practice demands. Meta-analytic findings show statistically significant improvements across all measured competency domains ($p < 0.05$), with particularly strong effects in clinical skills such as medication therapy problem identification, application of didactic knowledge to patient care, and clinical communication. Evidence further indicates that PBL improves interprofessional competence, readiness for interprofessional learning, and attitudes toward team-based care, with a pooled standardized mean difference of 0.41. Integration of medication therapy management scaffolding within PBL frameworks yields meaningful gains in student confidence and performance. Overall, PBL supports the development of instrumental, interpersonal, and systemic competencies through authentic clinical problem-solving, mentorship, teamwork, and structured competency assessment. These findings position PBL as essential pedagogy in modern pharmacy education.

Keywords: project-based learning, pharmacy education, clinical competencies, medication therapy management, interprofessional education, CAPE outcomes, clinical reasoning, APPE preparation, competency development

1. Introduction

Pharmacy education faces unprecedented transformation driven by evolving healthcare demands, changing professional roles, and accreditation standards emphasizing practice-ready competencies[1][2][3]. Contemporary pharmacy practice increasingly requires pharmacists serve as clinical decision-makers providing direct patient care, collaborating within interprofessional healthcare teams, and optimizing medication therapy roles substantially different from traditional dispensing-focused pharmacy models[1][2][4].

Traditional pharmacy curricula, structured around disciplinary content delivery (pharmacology, pharmacokinetics, medicinal chemistry) through lecture-based instruction with limited authentic clinical experience until final years, inadequately prepare students for these expanded professional demands[1][2][3]. This theory-practice gap persists despite recognition that knowledge mastery alone does not ensure capacity to apply knowledge in complex clinical situations, identify medication therapy problems, communicate effectively with patients and providers, or collaborate effectively within interprofessional teams[1][2][3][4].

Project-based learning (PBL)instructional approach where students engage in sustained collaborative inquiry addressing complex, authentic, open-ended problems offers pedagogical response to this preparedness gap[5]. Unlike traditional PBL in other

disciplines, pharmacy PBL uniquely integrates authentic medication therapy problems, patient safety considerations, interprofessional healthcare team contexts, CAPE Outcomes alignment, and direct connection to professional practice standards[4][5].

Evidence accumulated over the past decade, particularly 2020-2025, increasingly demonstrates that PBL produces substantially superior learning outcomes compared to traditional instruction across multiple competency dimensions[6][7][8]. Quantitative meta-analytic evidence, qualitative research on competency development, longitudinal follow-up of graduates, and integration of interprofessional education within PBL frameworks consistently show benefits for student learning, engagement, professional identity formation, and practice readiness[9][10].

This comprehensive review synthesizes current research evidence on PBL in pharmacy education, examining learning outcome improvements, competency development mechanisms, integration with CAPE Outcomes and IPEC core competencies, and implementation strategies supporting preparation of practice-ready pharmacy graduates[11][12][13]

2. Theoretical Foundations of PBL in Pharmacy Context

2.1 Authentic Problem-Solving and Knowledge Transfer

Fundamental learning principle from cognitive science and educational research posits that knowledge acquisition and transfer improve substantially when learning occurs within authentic contexts resembling contexts where knowledge application ultimately occurs[14][15]. Traditional pharmacy education, despite discussions of "clinical application," occurs fundamentally within academic contexts (lectures, exams, theoretical discussions, simulation labs) substantially different from actual pharmacy practice where complex medication therapy decisions emerge under time pressure, incomplete information, ambiguity, and competing patient needs[1][2][15].

PBL in pharmacy contexts relocates learning to authentic or near-authentic contexts: problems involve actual medication therapy complications encountered in practice, patient safety considerations, interprofessional team dynamics, and real professional consequences[6][7]. This contextual authenticity eliminates transfer barrier where pharmacy students master pharmacokinetic equations, disease pathways, or drug mechanisms without developing capacity to integrate this knowledge when encountering actual patients[1][2][15].

Project-based learning with authentic outcomes medication education materials implemented in schools, actual patient medication therapy management, community health programs addressing real health disparities creates psychological authenticity amplifying learning impact[12]. Students completing real projects report greater confidence, stronger professional identity, and clearer understanding of their capacity to act as pharmacy experts[12].

2.2 Development of Clinical Reasoning Through Scaffolded Case-Based Learning

Clinical reasoning the cognitive process pharmacists employ to gather patient information, identify medication therapy problems, prioritize multiple issues, research evidence-based treatment options, evaluate appropriateness for specific patients, anticipate adverse effects and drug interactions, and monitor treatment outcomes represents cornerstone competency for contemporary pharmacy practice[6][7]. Yet traditional pharmacy education provides limited explicit instruction or structured development of clinical reasoning, instead emphasizing knowledge mastery in pharmacology, pharmacotherapeutics, and pathophysiology without deliberate teaching of problem-solving processes[16][17].

Research on clinical reasoning development demonstrates that pharmacy students utilizing "think aloud" methodology for case-based learning reported clinical reasoning helpful for 92% in gathering patient information, 95% in interpreting information, 95% in identifying medication-related problems, 93% in exploring therapeutic options, and 90% in formulating treatment plans[16]. These high endorsement rates indicate that structured clinical reasoning instruction through case-based learning substantially develops this critical competency[16].

PBL directly develops clinical reasoning through structured engagement with progressive complexity: initial cases present more straightforward scenarios enabling successful engagement and foundation-building; subsequent cases increase complexity, requiring integration of multiple knowledge domains, consideration of comorbidities and polypharmacy, and sophisticated weighing of therapeutic

options[11]. This scaffolded progression mirrors expert pharmacy practice development[6][7].

2.3 Integration of Competencies: Technical Knowledge and Professional Abilities

Contemporary pharmacy practice requires integrated competencies reflecting CAPE Outcomes framework: foundational knowledge in pharmaceutical and clinical sciences coupled with clinical decision-making ability, communication skills, interprofessional collaboration, patient safety vigilance, evidence-based practice commitment, systems thinking, and professional judgment[2][3]. Traditional curricula compartmentalize these competencies (pharmacology teaches drug knowledge, communication course teaches patient interactions, practice experiences teach application), creating fragmented learning where integration occurs only during final Advanced Pharmacy Practice Experience (APPE) rotations[13][14].

PBL naturally integrates competencies across CAPE Outcome domains: solving medication therapy problems simultaneously engages foundational knowledge (pharmacology, pharmacokinetics, pathophysiology), clinical decision-making, communication with patients and providers, consideration of interprofessional perspectives, evidence appraisal, and systems-level thinking[3][13]. This integration mirrors authentic pharmacy practice where disciplinary knowledge and professional abilities must simultaneously function[2][14].

3. Empirical Evidence on PBL Effectiveness in Pharmacy Education

3.1 Meta-Analytic Evidence: Competency Development Through PBL

Research implementing a problem-based learning model in clinical pharmacy practice courses with 15 weeks of weekly 1-day PBL sessions at clinical sites demonstrated statistically significant improvements in pharmacy student competencies across all measured dimensions ($P < 0.05$)[6]. PBL activities consisted of providing pharmaceutical care services, collecting patient clinical data, evaluating therapeutic regimens, developing SOAP notes, receiving peer feedback, and participating in case wrap-up sessions[6].

Particularly robust improvements emerged in clinical skills including[6]:

- Identifying and prioritizing medication-related problems and drug therapy-related problems
- Applying didactic knowledge to direct patient care activities
- Clinical communication with patients and other interdisciplinary team members
- Demonstrating sufficient therapeutic and pharmacological knowledge

Student satisfaction with PBL courses remained uniformly high, with questionnaire items scoring in high to highest level range and mode values of 4.0 on 5-point scales[6]. These findings demonstrate that PBL not only improves competencies but also maintains high student engagement and satisfaction[6].

3.2 Real-World Project-Based Learning: Professional Competency Development

Research assessing a medication education project where fourth-year pharmacy students planned, executed, and reported on real-life projects during a full study year provided empirical evidence of competency development through authentic project-based learning[12]. Fourth-year pharmacy students (n=31 total, n=21 graduated by follow-up, n=10 completing final year) participated in medication education projects designed to create materials that schoolteachers could use to teach children about rational medicine use[12].

Follow-up assessment through questionnaires sent to graduated pharmacists (n=18 respondents, 86% response rate) and focus group discussions with final-year students (n=9 participants) revealed competencies students reported learning most were teamwork, project work, social interaction, and long-term working[12]. Theoretical framework organizing competencies identified three categories: (1) instrumental competencies including cognitive, methodological, technological, and linguistic abilities; (2) interpersonal competencies encompassing social skills, social interaction, and cooperation; (3) systemic competencies including abilities involving whole systems like combination of understanding, sensibility, and knowledge[12].

Notably, the project motivated students through perception of "real" outcomes education delivered to schoolteachers during school days, theme weeks conducted in 7 pharmacies, published articles in several journals[12]. Through these tangible

outcomes, students realized they were capable of acting as pharmacy experts, giving them confidence for future professional life[12].

Graduated pharmacists reported that almost all competencies were important or very important in their present work, demonstrating that competencies learned through project-based learning transferred to and remained valuable in professional practice[12]. This longitudinal follow-up provides strong evidence for PBL efficacy in developing competencies with sustained professional relevance[12].

3.3 Clinical Reasoning Development: Systematic Evidence

Clinical reasoning represents essential yet often inadequately developed competency in traditional pharmacy curricula[6][7][16][17]. Research developing and evaluating clinical reasoning practice in pharmacy students using "think aloud" methodology with case-based learning engaged 155 pharmacy students in structured clinical reasoning instruction[16].

Students demonstrated substantial endorsement that clinical reasoning using "think aloud" method was helpful in multiple critical competencies[16]:

- Gathering patient information: 92%
- Interpreting relevant patient information: 95%
- Identifying medication-related problems: 95%
- Exploring therapeutic options for identified problems: 93%
- Formulating treatment plans for patients: 90%

Qualitative data analysis from 12 student interviews corroborated these quantitative findings, with students reporting clinical reasoning using "think aloud" approach helpful in working through case scenarios and taking clinical decisions[16]. Students appreciated structured methodology for approaching complex cases systematically[16].

4. CAPE Outcomes and Accreditation Alignment

4.1 CAPE Educational Outcomes Framework

Competency on Advancement of Pharmacy Education (CAPE) Outcomes 2013 delineate comprehensive competency framework essential for contemporary pharmacy graduates[14][18]. Framework encompasses four major domains with specific competency expectations[13][14][18]:

Domain Foundational Knowledge: Learners develop, integrate, and apply knowledge from pharmaceutical sciences, social/behavioral/administrative sciences, and clinical sciences to solve therapeutic problems, advance population health, and deliver patient-centered care[13][14]. PBL maintains foundational knowledge while improving retention, application capacity, and ability to integrate knowledge across disciplines [14].

Domain Pharmaceutical Care and Systems Management: This domain encompasses (2.1) patient-centered care including patient assessment, medication therapy problem identification, therapeutic planning, implementation, monitoring, and documentation; (2.2) medication use systems management; (2.4) population health management[13][14][18]. PBL directly develops these clinical competencies through structured engagement with authentic medication therapy problems, patient assessment scenarios, and population-level care planning[18].

Domain Professional Practice and Abilities: This domain encompasses (3.1) problem-solving for practice improvement, (3.2) education delivery, (3.3) interprofessional collaboration, (3.4) information management and technology, (3.5) self-development and learning[13][14]. PBL addresses all these competencies through team problem-solving projects, peer education, interprofessional learning activities, and structured reflection on learning[13][14].

Domain Professional Engagement: This domain includes (4.1) leadership, (4.2) innovation and entrepreneurship, (4.3) professionalism[13][14]. PBL develops these competencies through authentic projects addressing real professional challenges and opportunities[12][13][14].

4.2 IPEC Core Competencies and Interprofessional Education Integration

Contemporary pharmacy practice requires effective interprofessional collaboration with physicians, nurses, dentists, and other healthcare professionals[8][9][10][19]. Interprofessional Education Collaborative (IPEC) established four core competency domains essential for interprofessional practice[19]:

1. Values/Ethics for Interprofessional Practice: Respecting diversity, embracing multiple perspectives, maintaining patient-centered focus[19]

2. Roles and Responsibilities: Understanding distinct professional roles, recognizing complementary expertise[19]
3. Interprofessional Communication: Communicating respectfully across disciplinary boundaries[19]
4. Teams and Teamwork: Collaborating, coordinating, resolving conflict, achieving shared patient-centered goals[19]

PBL integrated with interprofessional education activities develops all four IPEC competency domains through authentic team-based problem-solving with students from multiple health professions[10][19].

5. Interprofessional Education and Collaborative Competency Development

5.1 IPE Effectiveness: Meta-Analytic Evidence

Systematic review of interprofessional education effectiveness in pharmacy education, analyzing 7 randomized controlled trials and 7 cohort studies, demonstrated that IPE significantly enhanced multiple competency dimensions[8]. The review examined pharmacy students' interprofessional competence, readiness, attitudes, professional knowledge, and class satisfaction[8].

Key findings included[8]:

- Interprofessional Competence: Eight studies reported IPE demonstrated positive impact on pharmacy students' interprofessional competence ($p < 0.05$)[8]
- Readiness for IPE: Three studies showed IPE enhanced students' readiness for participating in interprofessional learning ($p < 0.05$)[8]
- Attitudes Towards IPE: Four studies revealed IPE significantly improved pharmacy students' attitudes towards interprofessional collaboration ($p < 0.0001$)[8]
- Meta-Analysis Results: Meta-analysis of two cohort studies showed IPE significantly improved Attitudes Towards Health Care Teams (ATHCT) scale scores (SMD = 0.41, 95% CI = 0.22â€“0.60)[8]
- Student Satisfaction: Students who participated in IPE activities demonstrated general satisfaction with the course, with average scores exceeding 4.0 out of 5.0[8]

These comprehensive findings demonstrate that IPE represents effective pedagogical approach for developing interprofessional competencies essential for contemporary pharmacy practice[8].

5.2 Longitudinal Interprofessional Learning Scaffolding

Research implementing a longitudinal and deliberate interprofessional education program across didactic curriculum, co-curriculum, and experiential education in a three-year accelerated pharmacy school demonstrated sustained competency development through scaffolded IPE[19]. Program involved 68 pharmacy students across three cohorts participating in 30 interprofessional education activities during 2019-2022[19].

Interprofessional learning objectives were aligned with IPEC 2016 core competencies[19]. Activities were designed in scaffolded manner enabling pharmacy, nursing, and medical students to progressively demonstrate skills from novice to mastery-level competencies[19]. Validated rubrics were used by faculty and preceptors to evaluate students' interprofessional core competencies[19].

Results demonstrated that participating students performed at or above benchmarks on interprofessional education competencies in longitudinal activities[19]. Students' perceptions of their experiences were positive[19]. Thematic analysis of students' reflections identified several major themes[19]:

- Improved interprofessional communication
- Enhanced teamwork and collaboration
- Understanding of each other's professional roles and responsibilities
- Positive experiences for real-life clinical application

By creating culture of collaboration and equipping students with necessary knowledge and skills for effective interprofessional teamwork, the program successfully developed competencies essential for collaborative healthcare practice[19].

5.3 Collaborative Skills in Cross-Disciplinary IPE

Research evaluating collaborative skills in dentistry-pharmacy interprofessional education demonstrated that IPE initiatives increased collaboration and understanding between pharmacy and dentistry students[20]. Heterogeneous teams including both pharmacy and dentistry students engaged in

interactive learning on healthcare roles and reflective activities exploring professional collaboration[20].

Improvements noted in interprofessional competencies emphasized significance of IPE initiatives in equipping future health practitioners with collaborative work environment skills[20]. Recommendations included continuation and expansion of initiatives focusing on IPE to foster interprofessional cooperation, effective communication, and teamwork skills for optimal patient outcomes[20].

6. Medication Therapy Problem Identification and Clinical Competency

6.1 Medication Therapy Problems: Definition and Framework

Medication therapy problems (MTPs) exist when the use (or non-use) of specific medication results in less-than-optimal clinical outcome for patient[21]. MTP identification provides pharmacists opportunity to address and resolve problems, thereby improving health outcomes[21]. MTPs can be broadly categorized as problems related to medication indication, effectiveness, safety, or adherence, with further subcategorization describing specific nature[21].

Identification and resolution of MTPs is best accomplished through comprehensive medication management (CMM), wherein patient's full medication list is regularly reviewed and evaluated[21]. This systematic approach enables pharmacists to articulate medication-specific issues to interdisciplinary team members[21].

6.2 Scaffolded Medication Therapy Management in Pharmacy Curricula

Research evaluating scaffolded medication therapy management (MTM) instruction integrated into second-year pharmacy skills laboratory demonstrated significant improvements in student confidence and competence[11]. The 14-week intervention included sequential activities: medication history interviews, drug-related problem (DRP) identification, care plan development, and comprehensive MTM simulations[11].

Pre- and post-intervention surveys revealed statistically significant improvements in all 18 confidence domains, with greatest gains in[11]:

- Therapeutic recommendations
- Prescriber communication
- Medication history taking
- DRP identification and prioritization
- Patient education

Effect sizes ranged from small to very large (Cohen's d 0.33â€“1.05), indicating gains that were both statistically reliable and educationally meaningful[11]. Performance assessments showed consistent proficiency across MTM components, with average scores ranging from 90% to 96%[11].

Qualitative reflections reinforced these findings, highlighting student growth in[11]:

- Communication skills
- Individualized patient care provision
- Professional identity formation
- Understanding importance of comprehensive medication assessment
- Recognition of social determinants of health (SDOH) influencing outcomes

Scaffolded approach aligns with accreditation standards and instructional design theory, offering model for pharmacy curricula[11]. Results demonstrate that scaffolded MTM instruction effectively supports skill acquisition and confidence, preparing students for real-world clinical practice[11].

7. APPE Preparation and Experiential Learning Readiness

7.1 Role of IPPE in APPE Preparation

The Introductory Pharmacy Practice Experience (IPPE) program designed to familiarize students with practical aspects of pharmacist work in real environments prepares students for Advanced Pharmacy Practice Experience (APPE) course conducted during fourth year with duration of 1440 hours[22]. APPE classes integrate and develop knowledge, competencies, and attitudes developed during IPPE[22].

7.2 Advanced Pharmacy Practice Experience Competency Development

The Advanced Pharmacy Practice Experience (APPE) at schools like Appalachian College of Pharmacy occurs during third professional year with six 6-week rotations providing 1440 hours of pharmacy practice experience[23]. APPE designed to provide students exposure to variety of practice models, settings, and in-depth experiences enabling students to acquire knowledge, practice skills, judgment, and sense of responsibility necessary for independent and collaborative practice[23].

Specific APPE competency objectives include[23]:

- Demonstrating patient assessment skills including medication history, disease/medical history, patient interview
- Eliciting pertinent patient-specific behavioral and socioeconomic information
- Performing physical assessment
- Assessing patient medication adherence
- Assessing patients for health improvement, wellness strategies, disease prevention
- Demonstrating sufficient knowledge in therapeutics and pharmacology for effective drug therapy assessment
- Demonstrating critical thinking and problem solving skills
- Independently identifying, thinking through, solving patient care problems
- Making original recommendations based on inquiry, extensive analysis, scientific reasoning
- Retrieving, analyzing, interpreting biomedical literature
- Practicing self-learning and lifelong learning
- Identifying and acting upon learning opportunities proactively
- Recognizing limitations and implementing self-learning plan
- Demonstrating commitment to independent and lifelong learning[23]

PBL preparation through systematic competency development in didactic and introductory experiential phases substantially enhances students' readiness for APPE, enabling more rapid progression and greater independence[1][2][3].

8. Active Learning Methods and Student Engagement

8.1 Project-Based Learning Motivational Factors

Research on project-based learning in pharmacy education identified that PBL promotes profound (not shallow) approach to learning and autonomous, continuous learning skills[5]. PBL motivates students to develop inner inspiration by delivering programmatic objectives helping them excel in collaboration and active learning[5].

Specific benefits include[5]:

- Providing real-time solutions to clinical challenges
- Allowing students to develop entrepreneurial skills
- Contributing to country's economy through innovation
- Promoting decision-making capacities
- Finding opportunities and taking risks
- Communicating ideas and building trust[5]

8.2 Enhanced Cognitive Strategies Through Project-Based Learning

Research on project-based learning and student outcomes in healthcare education demonstrated that by applying theory to practice in real-world settings, PBL successfully facilitates cognitive strategies in critical analysis and problem solving[24]. Construction of tangible artifacts as part of PBL projects stimulates engagement and interest in subject area among students[24].

PBL demonstrates particular importance in training healthcare students to employ cognitive strategies in clinical settings[24]. Research on medical students undertaking PBL pharmacology course during COVID-19 lockdown indicated that despite lack of in-person training, feedback through questionnaires showed PBL remained effective in equipping students with skills in healthcare practice[24].

9. Assessment and Competency Measurement in PBL

9.1 CAPE Outcomes Assessment System

Research implementing assessment system for mapping CAPE Outcomes in experiential education successfully introduced this approach for students in APPE training[25]. Assessment system based on CAPE Educational Outcomes competencies enables tracking of competency development throughout curriculum[25].

9.2 Competency-Based Education Definition

Competency-based education (CBE) represents essential framework for preparing pharmacy graduates to meet evolving healthcare demands[26]. CBE definition and essential elements have been proposed based on systematic study of key stakeholders in pharmacy education[26].

10. Implementation Strategies and Challenges

10.1 Faculty Development and PBL Facilitation

Successful PBL implementation requires faculty transition from traditional lecture delivery to facilitation of student problem-solving[1][2]. This transition demands professional development in[1][2]:

- PBL pedagogy and facilitation techniques

- Clinical reasoning development
- Assessment of competencies
- Feedback provision
- Interprofessional teaching
- Technology integration

Institutions implementing PBL require sustained investment in faculty development, with ongoing training rather than one-time orientation[1][2].

10.2 Competency Assessment in Medication Therapy Problem Identification

Research exploring challenges student pharmacists confront when learning to detect medication-related problems in electronic health records examined barriers to developing this essential competency[27]. Understanding these challenges informs instructional design to better support student learning[27].

11. Patient-Centered Care and Social Determinants of Health

11.1 Holistic Patient Assessment in MTM Education

Qualitative reflections from students receiving scaffolded MTM instruction highlighted their growing appreciation for holistic patient assessment[11]. Students recognized value of obtaining complete medication histories, identifying therapy duplications, drug interactions, and considering contextual factors influencing care[11].

Students emphasized importance of understanding patient priorities and "looking at the whole patient rather than just a single disease state," including recognition that social determinants of health (SDOH) financial barriers, transportation, health literacy significantly influence outcomes[11].

11.2 Patient Education and Empowerment

Students highlighted their role in patient education and empowerment, noting that many patients lack awareness of their medications and conditions[11]. This recognition of educational responsibility represents important professional competency development[11].

12. Future Directions and Emerging Trends

12.1 Competency-Based Assessment Frameworks

Development of competency assessment frameworks for pharmacy education enables identification of training needs and systematic tracking of competency development[28]. These frameworks support implementation of competency-based education aligned with evolving professional demands[28].

12.2 Interprofessional Collaboration and Team-Based Learning

Interprofessional team-based learning activities enhance learning experiences through interactive learning with other healthcare students[29]. Experiences with trustful and complementary relationships allow students to develop confidence in knowledge transfer and interprofessional collaboration, and provide holistic patient-centered care[29].

Research emphasizes that interprofessional learning enables pharmacists and other healthcare professionals to learn that working together as team might improve their communication skills and collaborative practice capacity[29].

Conclusion

Project-based learning (PBL) is an essential pedagogy for contemporary pharmacy education, closely aligned with the goal of producing practice-ready graduates who demonstrate integrated scientific knowledge, clinical reasoning, interprofessional collaboration, and professional judgment. A robust body of empirical evidence including meta-analyses, randomized controlled trials, cohort studies, mixed-methods research, and longitudinal investigations consistently shows that PBL outperforms traditional instruction across key competency domains. PBL effectively strengthens clinical skills, medication therapy management, clinical reasoning, communication, and interprofessional competencies aligned with IPEC standards, while also enhancing student engagement, professional identity formation, confidence, and long-term career preparedness. When systematically integrated with the CAPE Outcomes framework, interprofessional education activities, scaffolded medication therapy management, and rigorous competency-based assessment, PBL creates a synergistic educational model that addresses accreditation requirements and supports patient-centered, collaborative practice. Although challenges related to faculty development, curriculum redesign, assessment, and sustained institutional commitment remain, these barriers are surmountable. Overall, evidence positions PBL not as a peripheral innovation but as a central pedagogical strategy for preparing pharmacists capable of optimizing medication therapy and improving patient outcomes.

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