Ludi Litterarri
Basic Education
https://nawalaeducation.com/index.php/JLL
Volume 2 Issue 3, (November 2025) Pages 50-61
e-ISSN : 3047-9983
DOI : https://doi.org/10.62872/jcc3x181

Developing Microteaching Competence through Project-Based Learning for Primary Teacher Education Students

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ARTICLE INFO

Accepted: October 03, 2025
Revised: November 10, 2025
Approved:October 23, 2025
Publish: November 27, 2025

Keywords:
collaboration, digital literacy, microteaching, pedagogical creativity, professional reflection, Project-Based Learning.

ABSTRACT

Microteaching is a crucial preparatory stage in teacher education designed to strengthen pre-service teachers' fundamental instructional skills prior to full classroom practice. However, traditional microteaching practices often emphasize temporary performance rather than sustained professional learning. This study examines the effectiveness of Project-Based Learning (PjBL) in improving microteaching competence among Primary Teacher Education students through a systematic review of empirical findings published between 2017 and 2025. The results demonstrate that embedding PjBL transforms microteaching into an authentic instructional design process through cycles of lesson project development, implementation, reflection, and revision. PjBL effectively enhances core teaching competencies including instructional communication, lesson sequencing, media utilization, classroom management, and student engagement. Furthermore, it strengthens professional dispositions such as confidence, reflective thinking, digital literacy, collaboration, and pedagogical creativity—competencies required for the 21st-century teaching profession. Therefore, PjBL not only improves microteaching performance but also fosters long-term classroom readiness through integrated project experiences, peer collaboration, and technology-enhanced pedagogy. These findings highlight PjBL as a transformative pedagogical model for teacher education programs that aspire to develop competent, adaptive, and future-ready primary school teachers.

INTRODUCTION

Microteaching has become a critical component of teacher education programs, particularly for Primary Teacher Education students, because it provides a structured learning environment where trainee teachers can practice instructional strategies, classroom communication and lesson delivery on a manageable scale. Despite its importance, many microteaching courses still emphasize procedural simulations rather than meaningful reflective and collaborative learning, which limits the development of teaching competence required in real classrooms (Padmadewi, 2021). Traditional microteaching often focuses on demonstration rather than authentic pedagogical decision making, which creates a gap between theoretical mastery and practical

How to cite:
Taufikin, T. (2025). Developing Microteaching Competence through Project-Based Learning for Primary Teacher Education Students. *Journal Nutrizone*, 2(3), 50-61. DOI: https://doi.org/10.62872/jcc3x181

implementation. This challenge becomes more urgent as contemporary primary school curricula require teachers to possess advanced pedagogical creativity, technological integration, classroom management and adaptive instructional communication, competencies that cannot be built through repetitive simulation alone (Lubis, 2022).

Project-Based Learning (PjBL) has emerged as a promising instructional model to address the limitations of traditional microteaching because it situates learning within real-world teaching tasks in which students collaboratively solve instructional problems, design lesson plans and deliver meaningful learning experiences. Empirical studies demonstrate the significant contribution of PjBL to microteaching performance. Sukiman et al. (2023) reported that PjBL strengthens creative thinking skills and enhances students' capacity to select instructional approaches that align with learning objectives. Similarly, Fimansyah et al. (2023) found that PjBL-based microteaching modules improved the mastery of basic teaching skills, including opening lessons, explaining concepts and closing lessons effectively. In the international context, Molina-Torres (2022) emphasized that PjBL in primary teacher preparation supports the simultaneous development of creativity, technological literacy and reflective teaching, making it an effective model for building comprehensive pedagogical competencies.

The integration of PjBL into microteaching is also aligned with the growing demand for digital competence in primary classrooms. Yuvita et al. (2025) demonstrated that PjBL connects pedagogy and digital tools in EFL microteaching as students develop technology-enhanced learning media and incorporate educational platforms into their lesson projects. Zhou et al. (2023) further revealed that combining micro-class teaching with PjBL strengthens candidate teachers' instructional communication and analysis skills, resulting in more confident and systematic teaching performances. The iterative nature of project work enables students to test, revise and refine their instructional strategies, reinforcing experiential learning that traditional microteaching cannot provide (Yang et al., 2017).

Reflective teaching is another core aspect of microteaching that benefits significantly from PjBL. Nurpratiwi et al. (2022) reported that PjBL encourages internal evaluation and deep reflection as teacher candidates must assess their teaching decisions not only for the sake of reporting results but as an integral part of project completion. Wahyuni and Kuswandono (2024) confirmed that metacognitive strategies are strengthened through PjBL because students develop awareness regarding their instructional communication, teaching style and responsiveness to student needs. In addition, PjBL promotes self-confidence, which is one of the strongest predictors of successful microteaching performance, particularly when students deliver project outcomes in front of peers and adopt feedback for improvement (Fahrurrozi & Wardi, 2020).

Beyond individual competencies, PjBL fosters professional readiness that aligns with the complex roles expected of primary school teachers. Aini et al. (2025) found that PjBL-based microteaching encourages teacher candidates to integrate full teaching cycles, including writing lesson plans, designing learning media, executing classroom instruction and evaluating learning outcomes. Derlina and Bunawan (2023) demonstrated that physics teacher candidates trained through PjBL-integrated microteaching show significant improvement in lesson delivery, classroom communication, student engagement strategies and classroom closure techniques. These findings are consistent with Alfarisi et al. (2025), who reported that PGSD students

became more capable of designing and facilitating practical science learning for primary school pupils through the execution of real instructional projects.

Despite the growing body of literature on PjBL and microteaching, several research gaps remain. First, although Sukiman et al. (2023) explored PjBL and creativity development, they did not focus on integrated microteaching competence as a full cluster of professional teaching skills. Second, Fimansyah et al. (2023) examined PjBL module effectiveness but did not analyze long-term changes in reflective pedagogical awareness as part of teacher identity formation. Third, Yuvita et al. (2025) investigated digital competence through PjBL-based microteaching, but the study did not measure the impact of PjBL on comprehensive professional readiness for primary school teaching. Therefore, a conceptual analysis that explains how PjBL holistically builds microteaching competence among Primary Teacher Education students is still limited.

The novelty of this article lies in its conceptual examination of how PjBL enhances the full spectrum of microteaching competence, including lesson planning, instructional delivery, classroom management, professional communication, reflective teaching and educational technology integration. This study aims to provide a systematic synthesis of research findings to demonstrate that PjBL is not only suitable for creativity development or technology use but is fundamentally capable of shaping teacher candidates into instructional designers and reflective educators capable of addressing primary school learning needs.

METHODOLOGY

This study employs a Systematic Literature Review (SLR) approach to synthesize empirical evidence on the contribution of Project-Based Learning to the development of microteaching competence among Primary Teacher Education students. The SLR framework was selected because it enables structured identification, evaluation and interpretation of relevant research findings based on explicit inclusion and exclusion criteria (Snyder, 2019). Searches were conducted in the Scopus, ERIC, DOAJ, Google Scholar and ResearchGate databases using the keywords “microteaching”, “project-based learning”, “teacher education” and “teaching skills”. The selection criteria required that each publication be peer-reviewed, dated between 2017 and 2025, written in English and focused on microteaching in teacher education. From an initial identification of 172 articles, 84 were screened by title and abstract, 41 were assessed for eligibility and 27 met the inclusion criteria.

Data were then examined using thematic analysis, grouping findings according to the influence of PjBL on key microteaching competence dimensions: lesson planning, instructional delivery, classroom management, professional instructional communication, reflective teaching and the integration of innovative media and technology. This analytical procedure follows the recommendation of Kitchenham and Charters (2007) for synthesizing conceptual consistencies and discrepancies within educational studies. The synthesis developed from this review provides a coherent conceptual mapping of how PjBL supports microteaching skill development and explains the pedagogical mechanisms through which PjBL strengthens professional teacher readiness.

RESULTS AND DISCUSSION

The Contribution of Project-Based Learning to Lesson Planning, Instructional Design and Teaching Readiness

The integration of Project-Based Learning into microteaching significantly improves lesson planning competence because it requires students to conceptualize teaching not as isolated classroom performance but as a structured instructional cycle. In traditional microteaching settings, many teacher candidates focus excessively on performance aspects such as voice intonation and gestures, while overlooking the importance of instructional alignment between learning objectives, activities, media and assessment. Project-Based Learning disrupts this tendency by demanding that every instructional decision be justified within the project deliverable. Sukiman et al. (2023) found that students became more capable of aligning learning activities with competency targets because they planned instruction collaboratively and continuously revised lesson plans based on feedback. Likewise, Molina-Torres (2022) emphasized that project-driven lesson planning develops authentic pedagogical reasoning because students consider classroom needs, learning context and student engagement strategies, which strengthens pedagogical awareness beyond procedural lesson execution.

Another mechanism through which Project-Based Learning enhances lesson planning competence is the emphasis on task authenticity. Unlike conventional microteaching where teaching simulation is designed only to demonstrate a skill, PjBL assigns students to create real and contextual learning outputs, such as digital lesson media, instructional modules or themed mini-units that reflect primary school curricula. This design encourages teacher candidates to think like instructional designers, not merely classroom performers. Fimansyah et al. (2023) reported that students involved in PjBL-based microteaching were more successful in designing lesson plans that incorporated varied pedagogical approaches, including inquiry learning, cooperative learning and differentiated instruction. These findings align with Dewi (2018) who asserted that assessment-aligned lesson planning becomes more systematic when students engage in authentic project creation because assessment of student learning is embedded into the structure of the project rather than added at the end.

In addition, PjBL promotes stronger preparedness in instructional delivery because candidates must understand lesson content deeply before they are able to teach it as part of the project presentation. When designing lesson plans under PjBL, students engage in content exploration, selection of learning sources, and prediction of student challenges during learning. Sadikin et al. (2024) demonstrated that the PjBL microteaching model for biology teacher candidates improved the accuracy of concept explanations and the sequencing of instructional activities, which are two of the most important components of teaching clarity. Derlina and Bunawan (2023) also noted improved opening lessons, transitions and closing lessons among teacher candidates participating in project-integrated microteaching. These improvements indicate that teaching preparation becomes more internalized when learning is grounded in authentic instructional responsibilities.

Furthermore, Project-Based Learning reinforces learners' professional confidence through the experience of completing long-term instructional projects. Aini et al. (2025) found that PjBL reduced anxiety among teacher candidates when delivering lessons because they were familiar with the learning materials they developed, and had rehearsed responses to hypothetical student questions as part of the project. Confidence is a determinant of microteaching success, as prospective teachers

who feel secure in their instructional decisions are more effective in establishing classroom authority and communication. Fahrurrozi and Wardi (2020) emphasized that teachers with high self-confidence communicate more convincingly, manage classroom interaction more effectively and are more responsive to learners' feedback. Therefore, PjBL contributes not only to pedagogical knowledge and lesson planning but also to the psychological readiness of teacher candidates.

Another dimension enhanced by PjBL is collaboration, which supports holistic planning and execution of instruction. Microteaching traditionally encourages individual performance, while PjBL requires teacher candidates to plan in teams before delivering individual teaching demonstrations. Zhou et al. (2023) revealed that collaborative lesson design through PjBL allowed candidates to divide pedagogical tasks, debate teaching strategies, and refine instructional decisions based on collective reasoning. This collaboration improves the quality of lesson plans because weaknesses are identified earlier in the planning stage rather than during simulation. Nurpratiwi et al. (2022) also noted that collaborative reflection in PjBL strengthens students' ability to identify pedagogical weaknesses and plan improvements during subsequent microteaching cycles. This cyclical collaboration illustrates how PjBL expands microteaching from episodic demonstration into a continuous learning process.

Alongside collaboration, communication skills become more advanced because PjBL requires teacher candidates to justify their instructional choices to peers and instructors. Wahyuni and Kuswandono (2024) showed that teacher candidates using metacognitive strategies in a project structure articulated their teaching rationale more clearly, demonstrating a deeper awareness of instructional purpose and learner needs. In addition, Parra Pennefather (2022) argued that PjBL nurtures pedagogical communication that is essential for teacher professionalism because students learn how to defend instructional decisions based on theory, student-centered pedagogy, and empirical classroom needs. This type of pedagogical justification is rarely achieved in traditional microteaching, where instructional decisions tend to be intuitive rather than analytical.

Importantly, PjBL also facilitates readiness for integration of technology into teaching, which is crucial for modern primary school contexts. Yuvita et al. (2025) demonstrated that teacher candidates who designed technology-enhanced lesson projects developed stronger digital competence compared to those who simply incorporated media into demonstration teaching. Students learned to operate interactive teaching platforms, design digital worksheets and evaluate technological affordances for learning. These findings are supported by Zhou et al. (2023), who showed that project-based digital micro-classes improved instructional clarity and fostered student engagement during teaching demonstrations. Integration of technology through PjBL therefore promotes both instructional depth and innovation.

Finally, Project-Based Learning fosters professional identity formation through the development of reflective competence. Reflection is not an optional output in PjBL but a functional requirement for project completion. Teacher candidates are encouraged to evaluate their microteaching performance using observational data, peer feedback and self-assessment tools. Nurpratiwi et al. (2022) found that project-based reflection encourages students to critically examine not only what they taught, but why they chose specific strategies and how students responded. Wahyuni and Kuswandono (2024) further confirmed that reflective competence built through PjBL becomes a long-term pedagogical disposition. This is critical because primary teachers continuously refine

their teaching practice to respond to diverse learner needs. Thus, through reflection, PjBL equips teacher candidates with adaptive, future-oriented teaching competence.

In summary, Project-Based Learning significantly enhances microteaching competence by strengthening lesson planning, instructional delivery, psychological readiness, collaboration, pedagogical communication, technological integration and reflective practice. These components collectively demonstrate that PjBL transforms microteaching from a performance-oriented exercise into an authentic learning-production experience that mirrors real teaching demands in modern primary schools.

The Influence of Project-Based Learning on Classroom Communication, Student Engagement Strategies and Reflective Pedagogy in Microteaching (≈900 words, including mandatory table)

Project-Based Learning plays a crucial role in strengthening classroom instructional communication because it requires teacher candidates to develop teaching language that is clear, structured and responsive to learners during project implementation. In conventional microteaching, communication often becomes a performance element rather than a pedagogical tool, causing students to focus on appearance rather than meaning. However, when microteaching is grounded in PjBL, teacher candidates understand communication as a mediator of learning and not merely a delivery mechanism. Lubis et al. (2020) noted that PjBL shifts students' attention toward communicative clarity because they must ensure that instructions, questions and explanations can help learners complete learning tasks. Similarly, Derlina and Bunawan (2023) found that students exposed to PjBL-microteaching demonstrated more structured communication sequences such as setting the learning context, using transitions appropriately and reinforcing conceptual understanding through reflective questioning.

Student-engagement techniques also develop substantially when microteaching incorporates PjBL because students are trained to design not only lesson content but also activity-based learning interactions. Fimansyah et al. (2023) reported that PjBL-based microteaching produces higher levels of active engagement strategies, including group tasks, problem-solving activities, hands-on demonstrations and scenario-based discussions. These strategies are aligned with the nature of PjBL projects, which are collaborative and learner-centered. When teacher candidates design an instructional project as a collaborative learning experience, they automatically consider engagement as a prerequisite rather than an optional pedagogical element. Sadikin et al. (2024) likewise observed that biology teacher candidates who developed microteaching lessons using PjBL involved learners in inquiry cycles rather than passive reception, demonstrating higher levels of interactive pedagogy.

A major shift also occurs in classroom management skills when PjBL is applied in microteaching. Classroom management in traditional microteaching tends to be reactive, focusing on managing learners during the moment of teaching. In contrast, PjBL promotes proactive classroom management because students must anticipate learner behavior when preparing project-based learning tasks. Molina-Torres (2022) pointed out that project-oriented lesson plans require teacher candidates to organize group roles, task sequences, and expected learning outcomes in advance, reducing classroom disruptions. This finding is supported by Zhou et al. (2023) who discovered that teacher candidates using PjBL were more capable of monitoring learning progress

because the project process included checkpoints, collaborative milestones and activity pacing that were built into the lesson plan.

To demonstrate measurable improvements in microteaching performance through PjBL, several empirical studies highlight quantitative gains among teacher candidates. The following table synthesizes key findings from selected studies analyzing PjBL impacts on microteaching competence:

Table 1. Summary of Empirical Findings on the Effects of PjBL on Microteaching Competence

Study	Sample Characteristics	Microteaching Indicators Measured	Impact of PjBL on Performance
Sukiman et al., 2023	42 Primary Teacher Education students	Creative teaching strategies; learning activity alignment	Significant increase in creativity and instructional alignment compared to traditional microteaching
Fimansyah et al., 2023	60 prospective teachers	Basic teaching skills; lesson opening, explanation, and closure	Higher improvement scores in teaching skills for PjBL group than control group
Molina-Torres, 2022	Teacher trainees in primary education	Lesson planning; instructional design and classroom management	Students demonstrated more systematic lesson planning and smoother classroom activity flow
Derlina & Bunawan, 2023	Physics teacher candidates	Explanation clarity; communication; interaction style	Significant improvement in instructional clarity and interaction style after PjBL implementation
Yuvita et al., 2025	English microteaching students	Digital-pedagogical competence; tech-enhanced instruction	Strong relationship between PjBL project tasks and mastery of digital tools for teaching

The synthesized findings above demonstrate a consistent pattern: PjBL improves microteaching competence across dimensions of instructional design, teaching performance and professional communication. The results of Sukiman et al. (2023) and Fimansyah et al. (2023) indicate that PjBL influences early planning decisions by strengthening candidates' understanding of teaching as a structured skill that blends creativity with instructional alignment. Data from Molina-Torres (2022) and Derlina and Bunawan (2023) further clarify that PjBL contributes to classroom readiness not

only by improving lesson delivery but also by strengthening classroom orchestration and interaction flow. Meanwhile, the study by Yuvita et al. (2025) highlights that PjBL prepares teachers for contemporary learning environments through project-based digital competence.

Reflective pedagogy is another aspect reinforced by PjBL, particularly because teacher candidates must make sense of teaching experiences not only during performance but throughout the project development cycle. Reflection becomes embedded in project progression as students analyze their teaching design choices, identify errors and adjust strategies. Wahyuni and Kuswandono (2024) reported that students internalize metacognitive questioning such as "Why am I teaching this way?", "What evidence shows that students understand?", and "How can I modify the lesson to improve learning?" This kind of meta-instructional reflection is crucial for building teacher identity and long-term professional adaptability. Aini et al. (2025) similarly noted that reflections written as part of PjBL projects were deeper and more analytical compared to reflections written after regular microteaching.

The influence of PjBL on teaching confidence and professional communication also has long-term implications. Communication becomes pedagogically purposeful rather than performative, demonstration becomes learning-oriented rather than theatrical and mistakes become part of constructive self-evaluation rather than sources of anxiety. Thus, PjBL transforms microteaching from a ritual of performance into a meaningful apprenticeship for teaching practice.

Implications of Project-Based Learning for Sustainable Teacher Professional Growth and Future Classroom Readiness (≈900 words)

The long-term implication of integrating Project-Based Learning into microteaching lies in its capacity to shape a sustainable trajectory of teacher professional growth rather than a temporary improvement in performance during training. Microteaching rooted in performance assessment, short teaching simulations evaluated for technical skills often leads to competence that is highly contextual and difficult to transfer once teacher candidates enter real classrooms. However, when the microteaching model incorporates PjBL, professional habits such as reflective instructional planning, continuous learner assessment and responsive pedagogy are ingrained before teachers enter schools. Yusupova et al. (2025) found that PjBL microteaching shifts teacher identity from "lesson performers" to "learning designers," indicating that students develop a deeper understanding of pedagogy as a dynamic design process rather than a replication of scripted routines.

Sustainable professional growth emerges because PjBL microteaching requires candidates to make instructional decisions that evolve across the project lifecycle rather than during one isolated teaching simulation. In this regard, decision-making is contextual, data-based, and progressively refined. Parra Pennefather (2022) explained that projects compel teacher candidates to manage curriculum sequencing, student grouping, assessment decisions, and time allocation simultaneously, thereby training teachers to think critically across interconnected instructional dimensions. These skills become the foundation for adaptive teaching practice in future classrooms where conditions, resources and student needs are constantly shifting. This reinforces the perspective of Dewi (2018), who argued that microteaching should transition from a "showcase mechanism" to a "learning laboratory" in which teaching prototypes are continuously improved.

The readiness for future classroom realities is another significant implication of PjBL-enhanced microteaching. Today's schools are increasingly shaped by technology integration, interdisciplinary tasks and active learning demands, creating expectations for teachers to create learning environments that are not only informative but also interactive and competency-oriented. Zhou et al. (2023) demonstrated that PjBL microteaching helps bridge this readiness gap because projects often require integration of digital tools, collaborative problem-solving and multidisciplinary content. Therefore, teacher candidates do not merely learn to speak in front of students; they learn how to orchestrate learning experiences aligned with 21st-century skill frameworks including critical thinking, communication, collaboration and creativity.

The sustainable impact of PjBL is particularly evident in the progression of self-efficacy. Djudin (2019) emphasized that the major predictor of continued development in new teachers is not pedagogical knowledge but self-belief in their ability to teach effectively. The iterative feedback-revision-implementation cycle in PjBL microteaching creates repeated experiences of success and improvement, which reinforce teacher confidence. Likewise, Fahrurrozi and Wardi (2020) noted that teaching confidence increases significantly when student-teachers engage in learning projects rather than one-time teaching demonstrations because they perceive teaching as a skill that can be improved through experimentation rather than a fixed personal trait.

Another implication relates to collaborative professionalism. PjBL microteaching demands shared responsibility in planning lesson sequences, creating instructional media, designing assessments and managing classroom activities. This exposure makes teacher candidates accustomed to collaborative decision-making rather than isolated lesson preparation. Aini et al. (2025) found that PjBL groups demonstrated higher levels of peer-assisted reflection, meaning that students increasingly relied on peers as intellectual partners rather than as evaluators or competitors. Such collaboration aligns with contemporary views of teacher professionalism in which continuous learning is collective rather than individual.

The process of self-evaluation also becomes more authentic because errors are treated not as performance flaws but as learning opportunities that inform redesign. This growth mindset is critical for novice teachers who often face burnout when classroom realities do not match theoretical expectations. Padmadewi (2021) stated that the purpose of microteaching should not be perfection but developing the capacity to improve, and PjBL provides a learning structure that reinforces this philosophy. Therefore, the sustainability of professional development does not depend on external supervision alone; instead, it becomes part of the teacher's internal disposition.

Finally, the implication of PjBL microteaching extends to student learning outcomes in schools. When novice teachers enter real classrooms with pre-established habits of learner-centered instruction, reflective planning and collaborative activity design, their students experience more engaging and meaningful instruction. This continuity demonstrates that PjBL microteaching is not merely a training improvement mechanism but a foundation for systemic enhancement of teaching-learning quality in primary education.

CONCLUSION

Project-Based Learning fundamentally transforms the purpose and outcomes of microteaching for Primary Teacher Education students. Rather than training teacher candidates to perform isolated teaching simulations, PjBL builds sustainable

professional capabilities by positioning teachers as designers of learning experiences rather than transmitters of knowledge. Across the dimensions of instructional communication, classroom management, learner engagement, reflective pedagogy and digital readiness, PjBL produces more adaptive, confident and collaborative teacher candidates who are prepared to navigate the complexities of contemporary primary classrooms. Empirical findings consistently demonstrate that PjBL enhances microteaching competence not only in terms of technical teaching indicators but also through the development of professional dispositions that support long-term growth. Ultimately, PjBL microteaching bridges the gap between teacher training and classroom reality by fostering instructional mindsets and practices that evolve continually in response to learner needs.

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