

Evaluating Project-Based Learning in Architectural Education at Thu Dau Mot University

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ABSTRACT

Project-Based Learning (PBL) is increasingly recognized as an active and effective pedagogical approach, particularly well suited to the specific demands of architectural education a discipline that necessitates the seamless integration of creative thinking, technical proficiency, and practical problem-solving skills. By engaging students from the Faculty of Architecture and Construction at Thu Dau Mot University in highly practical academic projects, PBL not only facilitates proactive knowledge acquisition but also fosters the comprehensive development of individual competencies. These include design thinking, collaborative teamwork, independent research capabilities, and critical reasoning. Survey results indicate significant positive transformations following the implementation of this method. Specifically, students' proactivity in researching and information retrieval increase by approximately 25%, reflecting a paradigm shift from passive reception to active knowledge exploration. Furthermore, teamwork skills a crucial element in architectural design processes demonstrated a substantial improvement of 18%, indicating enhanced efficacy in student coordination, communication, and idea-sharing. Concurrently, problem-solving capacities within architectural design encompassing contextual analysis, solution proposition, and design modification exhibited an approximate 12% increase compared to traditional pedagogical methods. These findings substantiate that the application of PBL not only elevates educational quality but also plays a pivotal role in cultivating essential professional competencies for architecture students (Taneja, 2022), aligning with the paradigm of modern, practice oriented education and current labor market demands.

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INTRODUCTION

According to Resolution No. 19/NQ-HDT (Thu Dau Mot University Council, 2025), the establishment and development of Thu Dau Mot University must be inextricably linked to the enhancement of educational quality through standardization, modernization, and international integration. The objective is to train a high quality workforce equipped with strong moral integrity, solid professional expertise, excellent practical skills, creative thinking, and high adaptability to meet socio-economic development demands in the context of the Fourth Industrial Revolution (Industry 4.0) and global integration. Furthermore, it aims to develop learners into Digital Citizens and Global Citizens who demonstrate responsibility towards the community and society. Thu Dau Mot University envisions becoming a model regional university within the Ho Chi Minh City mega-city footprint, possessing capabilities in education, research, innovation, and technology transfer on par with regional standards. It aspires to serve as a knowledge hub driving the development of high-tech industries, smart cities, logistics, and the digital economy in the northern region of Ho Chi Minh City.

In the era of the knowledge economy and modern educational transformation, the objective of education transcends the unidirectional transmission of knowledge, shifting decisively toward the comprehensive development of learner competencies. Consequently, learners are required not only to attain cognitive abilities (learning to know) but also to cultivate action-oriented capacities (learning to do) and social competencies (learning to live together), thereby fulfilling the escalating demands of the labor market and the knowledge society.

Within this paradigm, PBL emerges as an advanced, learner-centric pedagogical model that emphasizes the learner's active role in knowledge construction. By engaging students in solving complex, real-world problems, this method not only consolidates and broadens professional knowledge but also acts

as a catalyst for developing essential skills such as critical reflection, collaboration, communication, and problem solving. Thus, PBL facilitates the translation of theoretical knowledge into practical competence, satisfying the requirements of application oriented and sustainable educational frameworks.

Contemporary higher education is undergoing a profound transition from a content-based to a competency based training model, heavily emphasizing the application of knowledge to resolve practical issues (Ozorhon & Sarman, 2023). This shift is driven by the imperatives of modern society and the labor market, which necessitate that graduates not only master theoretical foundations but also exhibit the agility to apply them across diverse and complex contexts.

In the field of architecture, the specific nature of education demands the integration of scientific, technical, and artistic knowledge; hence, training objectives cannot merely reside in foundational knowledge transmission. Instead, educational programs must aim for the holistic development of core learner competencies, including design thinking, creative capacity, teamwork, and real world problem solving skills. These are pivotal factors enabling students to adapt to dynamic and increasingly complex professional requirements.

Among these, design thinking occupies a central role, assisting students in systematically formulating and evolving ideas while integrating functional, aesthetic, and contextual elements into design solutions. Creative capacity manifests in the ability to propose novel, unique, and practically relevant concepts. Furthermore, teamwork skills facilitate effective collaboration among peers during project execution, whereas problem solving proficiency empowers students to identify, analyze, and address design scenarios with flexibility and scientific rigor.

Consequently, innovating pedagogical methodologies toward a competency based approach, coupled with active learning strategies such as PBL, has become an imperative requisite for elevating the quality of architectural education, thereby responding to elevated societal demands and modern higher education trends.

Nevertheless, traditional teaching methodologies remain prevalent, often failing to create optimal conditions for students to exercise proactivity and develop professional competencies. Given this context, the implementation of teaching and learning through projects is posited as an appropriate intervention, contributing to methodological innovation and the enhancement of training quality for architecture students at Thu Dau Mot University.

Table 1. Inventory of Architectural Course Projects at Thu Dau Mot University

No	Content	No	Content
1	Architectural Project: Detached Housing	6	Architectural Project: Interior and Exterior Design
2	Architectural Project: Public Building 1	7	Architectural Project: Public Building 4
3	Architectural Project: Public Building 2	8	Urban Planning Project 1: Detailed Residential Group Planning
4	Architectural Project: Public Building 3	9	Architectural Project: Industrial Building
5	Architectural Project: Multi-story Housing	10	Comprehensive Project

METHOD

This paper is conducted based on a qualitative research methodology integrated with document analysis and synthesis. Specifically, the study involves the collection and utilization of secondary data sources, including scientific articles, research studies, specialized reports, and academic literature related to PBL in architectural education. Based on these sources, the data are analyzed, compared, and synthesized to elucidate the effectiveness of implementing the PBL method in design studio courses. The analytical results are subsequently utilized to evaluate the impact of this method on enhancing educational quality and cultivating the professional competencies of architecture students.

RESULTS AND DISCUSSION

Result

Theoretical Framework of Project-Based Learning

PBL is widely recognized as a modern pedagogical approach wherein the learning process is structured around student engagement in complex tasks intrinsically linked to real world problems (Thomas, 2000). Throughout this process, learners transcend passive knowledge reception to actively participate in the entire educational continuum, encompassing the stages of research, analysis, design, and final product development.

A defining characteristic of this method is its requirement for learners to mobilize in an integrated and flexible manner various components of their competencies, including specialized knowledge, practical skills, and academic attitudes. This mobilization is essential to effectively address assigned tasks within an open and interdisciplinary learning environment (Jin et al., 2018; Keenahan & McCrum, 2021). Through this mechanism, learners not only consolidate and broaden their knowledge base but also cultivate core competencies such as critical thinking, problem solving, collaboration, and communication. This aligns seamlessly with the imperatives of competency-based education amidst digital transformation and international integration (OECD, 2023; World Economic Forum, 2024).

PBL directs learners to execute a comprehensive design task within a defined timeframe, encompassing all phases of the creative process: from contextual research and analysis, through ideation and conceptual development, to the refinement of the final design product. In the context of teaching course projects (design studios), this procedure not only reflects the specific cognitive structure of the architectural discipline but also systematically replicates actual professional practice (Uluoğlu, 2000). Consequently, this methodology facilitates a paradigm shift in the educational model, transitioning from a knowledge-transmission approach to one grounded in experiential and practical learning.

The implementation of the project-based teaching and learning method for architecture students at Thu Dau Mot University typically progresses through five primary phases:

Table 2. The Project-Based Learning Procedure for Specialized Architectural Courses

Phase	Content	Deliverables
1. Site Survey and Analysis	Researching the site conditions, climate, local culture, and user requirements	Written report
2. Concept Formulation	Developing initial ideas and exploring the architectural language	Hand sketches Mind maps
3. Design Development	Drafting floor plans, elevations, and creating 3D models	Floor plan drawings Physical 3D models (using cardboard or foam board)
4. Refinement and Revision	Engaging in discussions and consultations with instructors	Revised drawings based on feedback
5. Final Defense	Presenting the project before the course evaluation jury/committee	Finalized report/Completed project portfolio

Research Subjects

Survey data were collected from sophomore, junior, and senior architecture students within the Faculty of Architecture and Construction at Thu Dau Mot University. Specifically:

- Sample Size: 80 architecture students enrolled in the second semester of the 2025–2026 academic year.
- Group Allocation:
 - + Group A (40 students): Instructed using the Project-Based Learning method.
 - + Group B (40 students): Instructed using the traditional teaching method.

The comprehensive dataset collected from the survey and experimental procedures will serve as a robust scientific foundation for the in depth analysis and evaluation of pivotal issues, as well as the core bottlenecks persistent in the current educational model. By cross referencing and interpreting the

statistical results, this research goes beyond merely identifying the status quo; it advances toward establishing a framework of strategic and feasible pedagogical solutions. The directional objective of these propositions is to fundamentally innovate teaching methodologies, thereby elevating the quality of higher education in architecture while minimizing the gap between academic theory and design practice.

Furthermore, the educational philosophy guiding this study aims to cultivate a future generation of architects comprehensively equipped with a unified system of knowledge, skills, and professional attitudes. The ultimate goal is to ensure that upon completing their academic pathway, learners will possess a solid professional foundation coupled with highly adaptable competencies. Consequently, they will be empowered to proactively seize and transform challenges into developmental opportunities, excellently meeting the rigorous standards of the profession. This adaptability is particularly crucial within a labor market and architectural practice ecosystem that are profoundly impacted and continuously reshaped by global integration trends and the era of digital transformation.

Survey Questionnaire Design (5-Point Likert Scale)

The 5-point Likert scale utilized in the survey is defined as follows:

- 1 – Very poor
- 2 – Poor
- 3 – Average
- 4 – Good
- 5 – Very Good

Table 3. Measurement of Knowledge Acquisition

No	Content
1	Proactive learning
2	Teamwork skills
3	Problem solving thinking
4	Design presentation and defense capabilities

Table 4. Measurement of Expected Learning Outcomes

No	Evaluation of Project Execution Outcomes
1	Design concept
2	Proposed building model analysis
3	Design development and physical modeling

Survey Results and Analysis

Table 5. Statistical Results on Knowledge Acquisition

Criteria	Group A (PBL)	Group B (Traditional)
Proactive learning	4.21	3.37
Teamwork skills	4.05	3.43
Design problem-solving	4.12	3.64
Presentation/Defense capabilities	4.18	3.76

The analytical results indicate that the student cohort instructed via the PBL method (Group A) achieved significantly superior outcomes compared to the control group utilizing traditional teaching methods across all surveyed criteria. Specifically, students in Group A demonstrated a higher degree of learning proactivity, more effective teamwork capabilities, greater flexibility in problem solving skills, and a more coherent and articulate presentation of ideas. These differences are consistent with the improved learning outcomes reported for process-based, student-centred studio pedagogy elsewhere (Xhambazi & Aliu, 2026), and they also reflect the tangible practical value of the PBL methodology within the context of modern education.

Notably, quantitative data reveals that the PBL method contributes to an approximate 25% increase in students' proactive learning. This suggests a paradigm shift where learners are more actively engaged in information retrieval, independent research, and overall participation in the learning process. Concurrently, students' teamwork skills improved by approximately 18%, manifested through enhanced coordination, effective task delegation, and mutual support during project execution. Furthermore, problem solving

competencies improved by roughly 12%, indicating an augmented ability to identify issues, analyze complex situations, and propose appropriate solutions within practical learning contexts.

Table 6. Statistical Results on Project Execution Outcomes

Criteria	Group A (PBL)	Group B (Traditional)
Design concept	4.32	3.78
Proposed building model analysis	4.06	3.60
Design development and physical modeling	4.20	3.82

A comparative analysis between the two cohorts demonstrates that the group subjected to the PBL method (Group A) achieved significantly higher scores than the group subjected to traditional methods (Group B) across all evaluated project execution criteria. This disparity affirms the pronounced efficacy of PBL in enhancing students' architectural design competencies, particularly concerning conceptual development and the proposal of innovative, breakthrough solutions.

Specifically, students in Group A exhibited an enriched ability to formulate design concepts that are both highly logical and practically applicable, alongside a demonstrated capacity to explore and develop these ideas multi dimensionally. Going beyond merely proposing initial solutions, these students showcased a strong aptitude for integrating aesthetic, functional, and contextual elements throughout the design process, thereby generating more refined and comprehensive architectural proposals. Additionally, this methodology contributed to the improvement of contextual analysis and technical implementation skills, evidenced by the students' ability to effectively gather and process information, and to translate specialized theoretical knowledge into design practice. However, it is worth noting that the magnitude of improvement in these latter two criteria was somewhat lower compared to the gains in conceptual development, suggesting that technical implementation and analytical modeling are areas requiring continued reinforcement and targeted pedagogical support within the training program.

Discussion

Advantages of Project-Based Learning

In a PBL environment, students no longer rely on the unidirectional transmission of knowledge; instead, they proactively seek, filter, and process information to resolve practical problems. Concurrently, criteria related to teamwork skills, design problem solving, and the ability to present and defend ideas also achieved higher scores, thereby indirectly confirming the development of critical thinking. During project execution, students frequently engage in discussions, debates, and multi dimensional feedback sessions, compelling them to analyze, evaluate, and defend their perspectives logically and with sound justification (Vyas et al., 2013). Going beyond mere knowledge reception, learners cultivate critical capacities by comparing alternative options, identifying limitations, and proposing optimal solutions. Thus, it can be affirmed that the PBL method not only enhances learning proactivity but also robustly fosters critical thinking, thereby elevating educational quality and the professional adaptability of students within the modern educational landscape.

Project evaluation results indicate that students participating in PBL tend to produce outputs that are highly innovative and possess greater practical relevance compared to those taught via traditional methods. Specifically, these design projects go beyond satisfying basic technical requirements; they distinctly demonstrate the ability to integrate creative concepts, flexible design solutions, and acumen in addressing real-world issues. This reflects an experiential learning process where students are encouraged to engage with practical scenarios, thereby proposing design alternatives that align with usage contexts and societal needs. Additionally, continuous participation in discussions, critiques, and product refinement throughout the project lifecycle significantly enhances the quality of the final deliverables. Consequently, the PBL method not only stimulates creative thinking but also aids students in developing the capacity to apply theoretical knowledge to practice, yielding educational outputs with high applicable value that closely approximate professional standards.

By structuring learning activities around projects, students experience the entire development cycle of a design product: from researching the context, defining task requirements, proposing concepts, and developing alternatives, to presenting and defending the final design before stakeholders (Park, 2020). This process not only simulates the fundamental steps of professional practice but also requires learners to synthesize specialized knowledge, teamwork skills, and professional communication. Moreover, integrating

feedback loops, modifying designs, and resolving unforeseen issues during project execution accustoms students to the pressures and flexibility inherent in real-world work environments. As a result, PBL effectively narrows the gap between academic training and occupational demands, enhancing students' adaptability and professional readiness upon graduation.

Limitations of Implementing Project-Based Learning

Faculty Resources and Workload

Although PBL is highly esteemed by scholars for its capacity to foster critical thinking and practical problem solving proficiencies in learners, the actual implementation of this methodology reveals substantial empirical barriers. Foremost among these challenges are the stringent resource requirements, particularly the amplified demands on faculty time, cognitive effort, and overall workload. In stark contrast to the traditional pedagogical model wherein the instructor predominantly functions as the central node of unidirectional knowledge transmission the PBL approach necessitates a complex paradigm shift. The educator must transition into the roles of a mentor, a facilitator, and an overseer of the learning trajectory. This structural role realignment consequently induces significant pedagogical pressures and a burdensome workload.

Specifically, the intrinsic nature of PBL is characterized by a high degree of personalization and openness. Each research cohort, or even individual student, typically proposes and pursues entirely distinct methodological approaches, theoretical frameworks, and problem solving strategies. This sheer diversity of project topics compels the instructor to continuously monitor the progress of each independent group from the initial stages of ideation and planning through to data collection and final outcome evaluation. To ensure the pedagogical efficacy of the method, instructors are obligated to provide regular and timely constructive feedback. This feedback is essential for scaffolding and calibrating the learning trajectory to align with the varying cognitive capacities of different student groups. Crucially, this continuous cycle of interaction and supervision transcends the spatial and temporal confines of formal lecture hours, frequently extending into extracurricular timeframes. The inevitable corollary is an exponential surge in both the sheer volume and intensity of faculty workload when juxtaposed with conventional didactic lecturing.

Furthermore, maintaining consistency and equitable quality in mentorship across diverse project groups presents a formidable challenge. In the practical context of many contemporary educational institutions characterized by large class sizes and suboptimal student to faculty ratios constraints in human resources render the equitable allocation of support time across all projects exceedingly difficult. Faculty cognitive overload can invariably lead to disparities in the depth of intervention and the quality of mentorship provided. This disparity, in turn, directly compromises the objectivity of the evaluation process and the ultimate learning outcomes of the students.

Derived from the aforementioned analyses, it is evident that to guarantee the feasibility and maximize the underlying pedagogical philosophy of PBL, educational institutions must institute systemic support mechanisms. On an organizational level, policies must be enacted to recalibrate standard teaching load metrics or reallocate instructional time quotas rationally. Such measures are vital to formally recognize and equitably compensate faculty for their intensive mentoring efforts. On a technological front, the accelerated integration of Educational Technology (EdTech) particularly Learning Management Systems (LMS) and online project management software emerges as a fundamental solution. These tools are indispensable for optimizing interaction spaces, mitigating administrative burdens, and ultimately enhancing the instructional efficiency of the teaching faculty.

Infrastructure and Facilities for Project-Based Learning

The physical infrastructure supporting the PBL methodology serves as a foundational pillar in ensuring implementation efficacy and elevating the quality of educational outcomes. This is particularly paramount within the context of competency oriented and learner centric higher education. Primarily, learning spaces must be architected for flexibility and reconfigurability to accommodate diverse pedagogical formats, including collaborative group work, in depth discussions, peer critiques, and conceptual presentations. Diverging from the traditional classroom paradigm characterized by fixed seating arrangements, modern learning environments should be outfitted with modular, mobile furniture that permits rapid spatial reconfiguration. This should be complemented by interactive projection and display technologies to stimulate learner proactivity and creative engagement.

Furthermore, capital investment in specialized instructional facilities encompassing design studios, simulation laboratories, computer labs, and maker spaces - is a pivotal factor enabling students to translate abstract concepts into tangible prototypes. These spaces must be comprehensively equipped with industry standard machinery, specialized software, and physical crafting materials, thereby providing students with the latitude to experiment, iterate, and refine their designs throughout the project lifecycle. Concurrently, the integration of advanced supportive technologies, such as Building Information Modeling (BIM), Virtual Reality (VR), or Artificial Intelligence (AI), will substantially enhance design fidelity, augmenting visual representation and the empirical simulation of practical solutions.

Additionally, a robust Information Technology (IT) infrastructure comprising high-speed internet connectivity, online learning platforms, and project management software plays an instrumental supportive role in bridging communication between faculty and students, as well as fostering linkages between the academic institution and industry stakeholders. This not only bolsters the seamless sharing of educational resources but also facilitates the real-time monitoring and evaluation of project progression and deliverable quality.

Collectively, synchronized and strategic investments in physical infrastructure not only amplify the effective deployment of the PBL methodology but also cultivate a contemporary learning ecosystem. Such an environment actively incentivizes creative cognition, problem solving proficiencies, and collaborative teamwork capabilities core competencies strictly demanded by the current labor market amidst the prevailing trends of global integration and digital transformation.

Assessment Tools

A notable limitation inherent to the PBL approach is its stringent requisite for an advanced system of evaluation tools and criteria. This demands a significantly higher degree of specificity, clarity, and consistency compared to traditional pedagogical frameworks. Because PBL intrinsically emphasizes the learning process, longitudinal individual progress, and the proportional contribution of each group member, evaluations cannot be predicated solely upon the final deliverable. Instead, they must holistically encompass a multitude of dimensions. Specifically, variables such as the extent of student engagement, collaborative efficacy within the team, critical thinking acumen, self directed learning capabilities, and problem solving proficiencies must be integrated into the assessment schema to accurately reflect the true nature of the learning trajectory.

However, in practical implementation, the absence of evaluation rubrics that are detailed, scientifically constructed, and strictly aligned with educational objectives frequently causes the grading process to devolve into subjectivity, heavily reliant upon the individual instructor's empirical experience and personal perspective. This phenomenon can engender substantial inconsistency among different faculty members when evaluating the same project or student cohort, thereby compromising the fairness and psychometric reliability of the assessment outcomes. Moreover, a deficiency in modern assessment support tools such as LMS, project milestone tracking software, or peer review platforms further constrains the capacity to monitor the learning process in a continuous and systematic manner.

Furthermore, the continuous tracking, documentation, and archival of student progress throughout the project's duration constitutes a formidable administrative challenge, particularly when dealing with large class sizes and a high volume of concurrent projects. This necessitates the deployment of efficacious management tools that enable instructors to monitor operational workflows, accurately appraise the specific contributions of individual learners, and dispense timely formative feedback to facilitate continuous improvement.

Consequently, to elevate the reliability, transparency, and equity of the evaluation process, it is imperative to construct a rigorously defined and uniform system of assessment criteria (rubrics) that is broadly disseminated to both faculty and the student body. Concurrently, synthesizing a diverse array of assessment modalities including self-assessment, peer assessment, and instructor evaluation coupled with the strategic application of supportive technological tools, will ensure a comprehensive reflection of both the educational process and the final academic outcomes. This holistic approach will thereby elevate the overall quality of competency based architectural education.

CONCLUSIONS

The research findings indicate that the application of the PBL methodology in teaching design projects within a studio based model significantly enhances students' learning outcomes. Specifically, learners exhibit marked development in core competencies such as creative cognition, problem solving abilities, and collaborative teamwork skills. The highly practical learning environment, anchored in design scenarios that closely mirror professional practice, creates optimal conditions for students to proactively explore, test ideas, and refine solutions through an iterative feedback process. Concurrently, the dynamic interaction between instructors and students within the design studio space fosters a highly personalized and in depth learning experience. These results demonstrate that PBL is an eminently suitable pedagogical approach for architectural education in the modern context, which intrinsically demands the seamless integration of professional expertise, creative thinking, and the capacity to adapt to complex, real-world challenges.

The PBL methodology can be regarded as a core pedagogical solution in actualizing the application-oriented educational philosophy of Thu Dau Mot University. By organizing academic activities around empirical projects, PBL enables students to concurrently cultivate specialized knowledge, professional skills, and the adaptability required to navigate a rapidly evolving societal landscape. Particularly within the discipline of architecture, this method allows learners to closely approximate actual professional workflows, thereby forging flexible design thinking, problem solving acumen, and effective collaborative capabilities.

Furthermore, within the context of the Fourth Industrial Revolution (Industry 4.0) where technology and data assume an increasingly pivotal role PBL serves to vigorously stimulate students' capacity for self directed learning, continuous knowledge acquisition, and the application of emergent technologies. Consequently, learners not only attain a robust professional foundation but also develop an acute sensitivity to innovative trends, thereby satisfying the escalating demands of the labor market. Therefore, the systematic and effective implementation of the PBL methodology will significantly contribute to cultivating a cohort of comprehensively competent architects, fully equipped to integrate into and thrive within the professional ecosystem of the digital era.

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