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Integrating Project-Based Learning in English Language Teacher Education for Sustainable Development Goals (SDGs)

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Abstract
This study aimed to improve teacher education by integrating project-based learning (PBL) into English language instruction. A motivational-cognitive-reflective model was developed and implemented using a mixed-methods approach. Data were collected through surveys, interviews, and observations involving pre-service English teachers and faculty. The findings showed enhanced planning, collaboration, and instructional competencies. This improvement occurred because PBL fosters active engagement, critical thinking, and reflective learning aligned with authentic classroom contexts. The framework enabled students to apply theoretical knowledge to practical scenarios, aligning with CEFR and IELTS teaching

standards. By promoting learner autonomy and contextual learning, the study advances Sustainable Development Goal 4 (Quality Education). The proposed model offers a scalable, evidence-based strategy for enhancing language teacher education globally.

Keywords: Education; English; Project-based learning; SDG4; Teacher training

Introduction

The integration of project-based learning (PBL) into teacher education is becoming increasingly significant, especially in the context of preparing English language educators to meet global instructional standards. With the growing demand for student-centered learning, educational institutions are transitioning from conventional rote methodologies to approaches that prioritize real-world application, critical thinking, and learner autonomy. In Uzbekistan, where English has gained prominence in educational reforms, there is a strong institutional and legal mandate to modernize foreign language teaching. Policies such as Presidential Decrees PF-4947 and PF-5847 underscore the urgency of aligning teacher preparation with international frameworks like CEFR, IELTS, and TOEFL to raise academic quality across all levels. However, despite clear policy support, many future English teachers still lack the pedagogical tools, especially those that develop their ability to organize instruction around student inquiry and collaboration. As research has shown, bridging this gap requires structured teacher training systems that include PBL as both content and strategy (Shaturaev & Khamitovna, 2023; Farida et al., 2024; Saadu, 2023; Suparto et al., 2023; Rosmayanti et al., 2024).

We also outlined the thematic domains of recent research supporting innovations in language education, including project technologies, foreign language instruction methods, professional competence, and global education trends (Haristiani & Rifai, 2021; Fatawi et al., 2024; Luckyardi et al., 2024a; Farida et al., 2024; Luckyardi et al., 2024b; Medani & Sakti, 2022; Saadu, 2023; Damayanti & Santosa, 2024; Mahmud et al., 2024). These demonstrated the interconnection between evolving pedagogical paradigms and institutional reforms across national and international contexts, reinforcing the relevance of this study in addressing existing gaps in teacher training practices.

In light of these developments, Uzbekistan's teacher education institutions have begun experimenting with hybrid curricula that incorporate both theoretical coursework and applied strategies such as PBL. Such changes are inspired by international findings from organizations like the Educational Testing Service (ETS), the National Institute for Educational Research (NER) in Japan, and the Consortium for Educational Research (EGER) in the UK. These bodies emphasize the importance of fostering experiential learning through projects to develop adaptable, critically engaged, and technologically literate teachers. National scholars also highlight that innovative pedagogies remain underutilized due to limited resources, fragmented professional development systems, and resistance to pedagogical shifts. Moreover, traditional classroom hierarchies continue to dominate, making it difficult for prospective teachers to internalize new methods through observation alone. Within this context, our study proposes an integrated methodological system that embeds PBL across three essential teacher development stages: motivational, cognitive, and reflective. This system aligns with the learner-centered paradigm and aims to enhance future English teachers' competencies in planning, communication, collaboration, and adaptability.

This study seeks to fill a critical gap by designing and empirically validating a methodological framework for training future English teachers in the effective use of PBL in their instructional practice. The model we propose is rooted in both global and local pedagogical discourses, addressing the need to strengthen academic skills while preparing teachers for

dynamic, multicultural, and digital learning environments (Husnia et al, 2023; Farida, 2023). The novelty of this research lies in the creation of a motivational-cognitive-reflective system tailored to the Uzbek context but informed by international best practices. Specifically, this study contributes to SDG 4 by offering a replicable and scalable strategy for enhancing educational quality through teacher empowerment. Thus, the purpose of this research is to improve the preparation of future English language educators by equipping them with a sustainable, evidence-based model of project-based teaching that fosters real-world readiness, interdisciplinary thinking, and long-term professional growth

Literature review

We provided a categorization of recent scholarly contributions related to language education, particularly focusing on the development of project-based technologies, foreign language teaching methods, and professional competence enhancement. This compilation highlights the diversity and depth of current research efforts aimed at transforming language education through innovation, aligning it with both cognitive development theories and instructional technology. The theoretical base is notably influenced by foundational works in experiential learning and pedagogical constructivism, providing a solid rationale for integrating PBL into the educational process.

The roots of project-based learning can be traced to progressive education reformers such as John Dewey and William Heard Kilpatrick, whose experiential learning principles emphasized the value of active student participation in real-world problem-solving. Dewey's philosophy advocated for learning through doing, while Kilpatrick coined the term "project method" to describe structured learning through purposeful tasks (Sutinen, 2013; Retter, 2018). These ideas were further expanded in the context of language instruction by Palmer and Walter, who emphasized that language acquisition is most effective when tied to authentic communicative situations (Howatt & Smith, 2014). Modern interpretations of PBL underscore the significance of sustained inquiry, authenticity, student choice, and public product as essential features of high-quality projects. Similarly, Goh & Kale (2015) introduced frameworks for the use of digital platforms in PBL, allowing for richer collaboration and accessibility. These theoretical developments lay a strong foundation for adopting PBL as a method that integrates linguistic, cognitive, and technological skills in future teacher training.

PBL's application in teacher education is gaining momentum globally due to its demonstrated ability to bridge theory and practice. Through structured, student-driven tasks, pre-service teachers engage in decision-making, reflection, and problem-solving, thereby building critical teaching competencies. Numerous studies report its effectiveness in improving self-efficacy, collaborative learning, and lesson design skills (Awofala & Akinoso, 2024; Khoiriyah et al., 2021). In the context of foreign language education, PBL supports the development of communicative competence by situating learning in socially and culturally meaningful activities. Within Uzbekistan, the adoption of PBL has been encouraged by national education reforms, particularly under Presidential Decrees PF-4947 and PF-5847, which mandate the modernization of teacher training programs and integration of ICT and learner-centered pedagogy. Legal instruments such as PQ-5117 emphasize the alignment of domestic language education with international standards like CEFR and TOEFL (Ruzimbayeyna, 2024). Nonetheless, challenges persist in implementing PBL at scale, including a lack of methodological clarity, limited institutional support, and insufficient teacher readiness to guide project-based instruction (Lam et al., 2010).

Despite these constraints, empirical studies conducted in Uzbekistan have shown promising outcomes in the use of PBL. Integrating project-based elements into teacher education enhances motivation, self-directed learning, and subject mastery among future teachers. Furthermore, works by Farouck (2016) and Zhao (2021) have documented how structured PBL assignments contribute to improving students' linguistic performance, intercultural competence, and engagement in complex tasks. Local universities have also piloted PBL-infused programs that incorporate WebQuest, case-based learning, and collaborative digital platforms to simulate real-world classroom conditions (Haristiani & Rifa'i, 2020; Farida et al., 2024; Luckyardi et al., 2024b). These approaches not only align with international benchmarks but also foster contextually relevant pedagogy rooted in Uzbekistan's educational vision. Accordingly, the current study is positioned within this evolving body of literature, contributing a validated methodological system that addresses pedagogical gaps while reinforcing the policy objectives outlined in national education strategies. By synthesizing global theories and local practices, this research adds new perspectives to the discourse on innovation in teacher education.

Research method

The methodological framework of this study was designed to evaluate the effectiveness of project-based learning in preparing future English teachers. Detailed information regarding this method is explained elsewhere (Susilawati et al., 2025).

The research involved participants from three major institutions: Tashkent State Pedagogical University, Chirchik State Pedagogical Institute, and Navoiy State Pedagogical Institute. A total of 956 pre-service English teachers and 100 faculty members participated in various phases of the pedagogical experiment. The research adopted a mixed-methods design integrating qualitative and quantitative approaches to provide a comprehensive understanding of instructional effectiveness. Figure 1 presents the phased design of the PBL-based model implemented during the study.

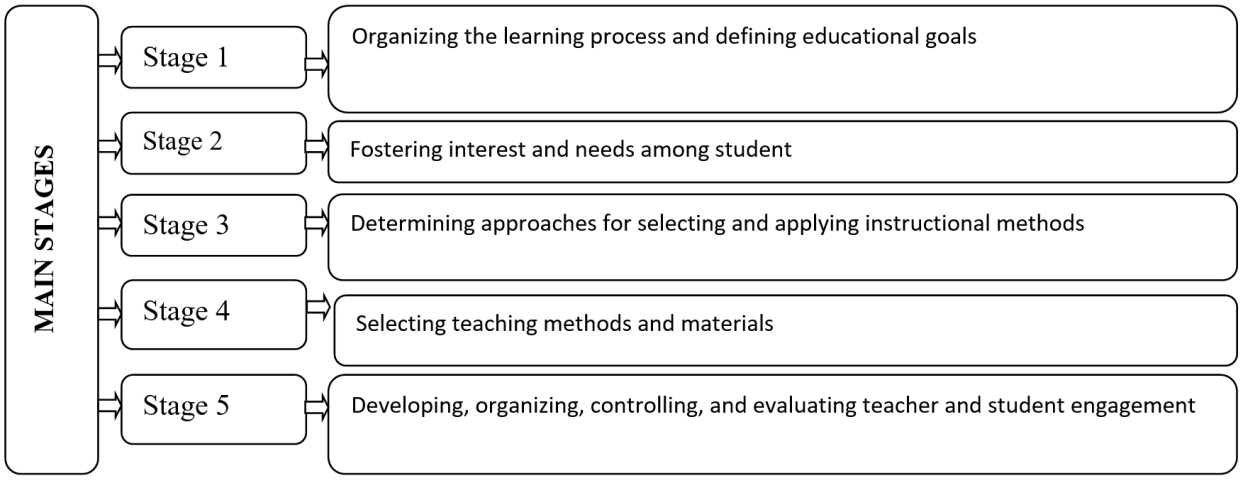

Figure 1. Stages of project-based learning

The experimental design included three key stages: diagnostic, formative, and conclusive. In the diagnostic phase, baseline competencies were assessed using surveys, interviews, and observational checklists to identify gaps in PBL understanding. The formative phase involved structured project activities guided by the developed motivational-cognitive-reflective model.

During this phase, learners engaged in tasks such as project planning, collaborative writing, presentations, and reflective journaling (Barbe et al., 2023). The conclusive phase focused on evaluating post-intervention outcomes using both descriptive and inferential statistical tools. Student performance was analyzed through assessments of project quality, participation, and instructional readiness. Faculty interviews and observation logs were used to triangulate findings and validate the behavioral indicators observed during sessions (Susilawati et al., 2025; Afifah et al., 2022; Masbara et al., 2024).

Figure 2 illustrates the methodological framework that structured the delivery of PBL throughout the intervention, including the alignment of objectives, content, tools, and assessment strategies. Each component of the model was tailored to develop planning, time management, and communicative skills among future teachers.

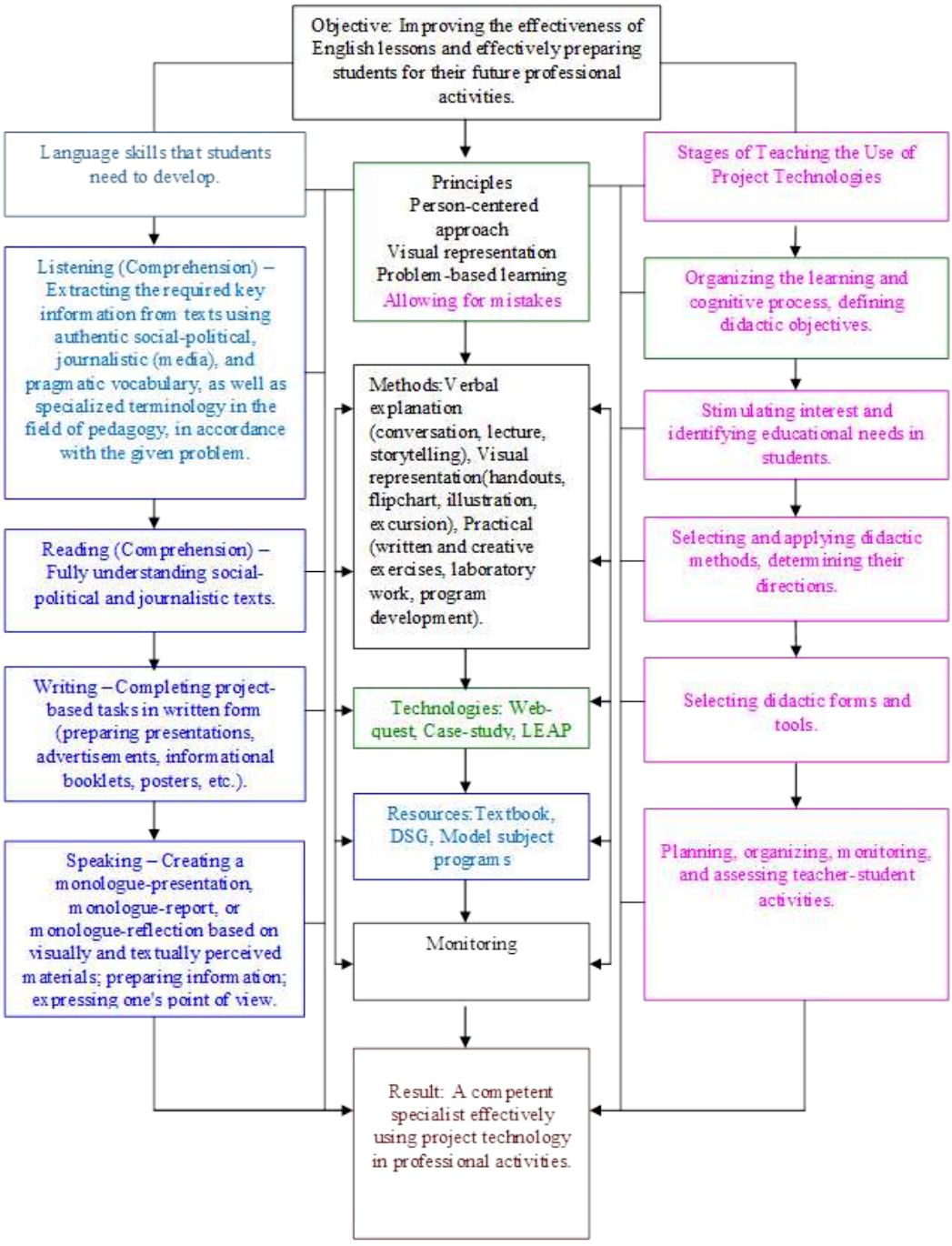

Figure 2. A methodological framework for applying Project-Based Learning in English classes

The analysis of learning outcomes was conducted using Student's t-test and Pearson's chi-squared test to compare the results between the experimental and control groups. We analyzed statistics to get a better understanding of the results. Detailed information on how to analyze using

statistical analysis is reported elsewhere (Fiandini et al., 2024; Rahayu et al., 2024; Afifah et al., 2022).

Figure 3 demonstrates the algorithm used to implement PBL in English instruction, ensuring consistent delivery across institutional contexts. The triangulation of data from various instruments enhanced the reliability and validity of the findings. The thematic analysis of qualitative data from interviews and reflections provided deeper insights into participants' experiences and the challenges they encountered during implementation (Fiandini et al., 2024; Rahayu et al., 2024).

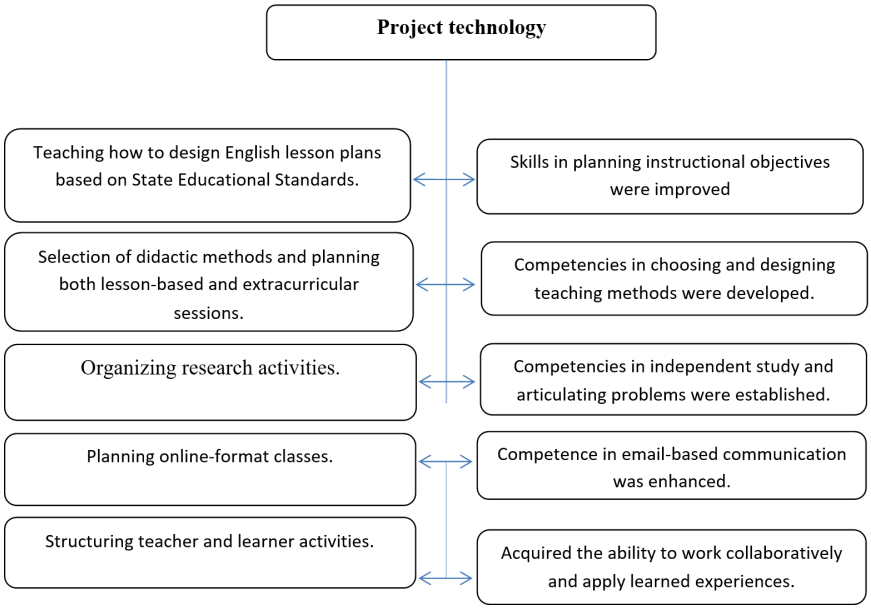

Figure 3. Algorithm for using project-based learning in english language teaching

This rigorous method allowed for the evaluation of not only academic improvements but also behavioral and attitudinal changes among learners. Furthermore, the research outcomes were assessed using standardized effectiveness indicators such as assimilation levels and competency shifts, which are presented in the Results and Discussion section.

Results and discussion

Improvement of professional competence through project-based learning

Table 1 presents the distribution of student performance across six targeted competencies: information search, project planning, time management, incorporation of strategies, presentation, and topic development. These results illustrate the learning gains achieved by the experimental group compared to the control group. The experimental group showed marked improvements across all indicators, particularly in project design and time management, suggesting the effectiveness of the implemented motivational-cognitive-reflective framework.

Table 1. Results of the experimental trials conducted to determine the formation and effectiveness levels of professional competencies based on the teaching of project technology in the educational process

Groups	Number of Students	Assimilation Levels			
		Excellent	Good	Satisfactory	Unsatisfactory

Searching and Selecting Information					
Experimental Group	481	190	131	119	41
Control group	475	122	125	117	111
Skills in Developing a Student's Own Project Concept and Plan					
Experimental Group	481	188	133	123	37
Control group	475	124	123	118	110
Time Management Skills					
Experimental Group	481	192	130	121	38
Control group	475	120	124	116	115
Incorporation of New Strategies and Approaches in the Project					
Experimental Group	481	194	127	120	40
Control group	475	123	120	124	108
Presentation Skills					
Experimental Group	481	193	129	120	39
Control group	475	125	121	119	110
Skills in Developing Topics and Plans for New Ideas					
Experimental Group	481	195	130	117	39
Control group	475	124	125	120	106
Total Results	5736	1890	1518	1434	894
Experimental Group	2886	1152	780	720	234
Control group	2850	738	738	714	660
Averages:	956	315	253	239	149
Experimental Group	481	192	130	120	39
Control group	475	123	123	119	110

The implementation of PBL in the training curriculum led to significant shifts in how future English teachers approached planning, critical thinking, and classroom organization. In the diagnostic phase, students exhibited only a surface-level understanding of instructional design and demonstrated limited ability to integrate multiple language skills into cohesive teaching plans. However, after exposure to the structured PBL model, participants in the experimental group began to formulate detailed lesson objectives, anticipate learner challenges, and adapt tasks to real-world communicative contexts. This evolution in pedagogical thinking reflects a deeper internalization of the competencies targeted by the model (Thomas, 2020; Rahmadani et al., 2024).

Students' enhanced ability to develop topic plans and structure projects was directly observed during classroom demonstrations and through reflective journals. Participants began to conceptualize projects not merely as group assignments, but as opportunities for linguistic, cognitive, and social integration. For instance, students created interdisciplinary modules that combined English with environmental education, thus fulfilling both curriculum objectives and promoting sustainability awareness. Such thematic integration encouraged students to think beyond textbook exercises and toward authentic language use, aligning well with the principles of CEFR (Nadtayay & Wongsaphan, 2025; Farida et al., 2024).

One of the most notable transformations was in the area of time management. As indicated in Table 1, a significant number of students in the experimental group achieved "excellent" ratings in this domain, whereas the control group's performance remained skewed toward "satisfactory" and "unsatisfactory" levels. This change can be attributed to the time-bound nature of PBL tasks, which required students to meet milestones, coordinate within teams, and deliver presentations within fixed schedules. These constraints cultivated in learners a discipline for tracking deadlines

and negotiating workloads—skills essential for professional teaching contexts (Khoiriyah et al., 2021; Saidirasilovna, 2025).

In addition to performance-based observations, interview data from faculty revealed enhanced confidence and autonomy among students exposed to the PBL model. Faculty noted that students were more willing to initiate discussions, seek feedback, and revise their work iteratively. These characteristics reflect an evolving mindset toward teaching as an adaptive, learner-centered practice rather than a routine transmission of knowledge. Such developments correspond with global trends in teacher education that emphasize reflective practice and active learning (Awofala & Akinoso, 2024; Haristiani & Rifai, 2021).

Figure 4 visualizes the comparative assimilation levels of students from both the experimental and control groups across four categories: excellent, good, satisfactory, and unsatisfactory. The experimental group consistently outperformed their counterparts, with the most substantial gap evident in the "excellent" category. This suggests that the applied methodology did not merely shift students from poor to average performance but facilitated their transition to higher-order thinking and output quality.

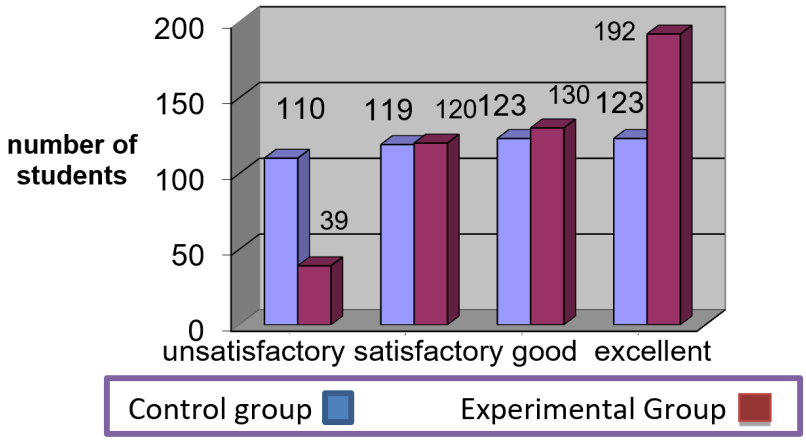

Figure 4. A diagram of the results of assimilation levels to determine effectiveness among students

These findings were supported by statistical validation using Student's t-test and Pearson's chi-squared test. Table 2 outlines the breakdown of post-intervention assimilation levels, while Table 3 presents statistical metrics such as mean square deviation, sample variance, and confidence intervals. The results confirmed the reliability of the improvement, with the experimental group demonstrating a 1.21-fold increase in overall professional readiness compared to the control group. This gain is not only statistically significant but also pedagogically meaningful, as it represents a shift from passive participation to proactive instructional competence (Afifah et al., 2022; Fiandini et al., 2024).

These statistical outcomes reinforce the observed behavioral changes in the classroom. Students in the experimental group were more likely to engage in metacognitive tasks, such as setting personal goals, assessing peer feedback, and articulating the reasoning behind instructional choices. In their reflective journals, several students reported feeling "responsible for learning outcomes" and "excited to try something new," indicating a shift toward teacher agency. Such qualitative evidence aligns with the reflective phase of the applied model, validating its relevance in teacher development programs.

Moreover, the study demonstrated the viability of implementing PBL in contexts with moderate technological infrastructure. Most tasks were completed using basic tools such as PowerPoint, printed handouts, and classroom projectors. However, in some institutions, students leveraged Google Classroom and WebQuest to coordinate group work and deliver outputs. These digital platforms enhanced accessibility and allowed asynchronous collaboration, supporting the flexible learning design required in contemporary pedagogy (Luckyardi et al., 2024a; Medani & Sakti, 2022). While not all groups had equal access to resources, those who did reported smoother task execution and better communication flow, indicating that digital literacy amplifies the benefits of PBL.

In conclusion, the first phase of the results underscores the effectiveness of the motivational-cognitive-reflective model in strengthening the professional competencies of future English teachers. By embedding PBL into training curricula, institutions can foster self-directed learning, professional responsibility, and a practical mindset in teaching practice. The combination of quantitative evidence, reflective narratives, and observed behavioral shifts provides a solid foundation for expanding this model to other language teacher training programs, especially in contexts aiming to achieve SDG 4 through transformative pedagogies.

Table 2. Statistical validation using Student's t-test and Pearson's chi-squared test

Groups	Number of Students	Assimilation Levels			
		Excellent	Good	Satisfactory	Unsatisfactory
Experimental Group	481	192	130	120	39
Control Group	475	123	123	119	110

Application of the motivational-cognitive-reflective model in lesson design

Figure 5 illustrates the motivational-cognitive-reflective model that guided the development and implementation of PBL in the participating teacher education programs. Each stage served a distinct role in cultivating the knowledge, attitudes, and behaviors required for effective instructional planning. The motivational stage focused on engagement through contextually relevant problems. The cognitive stage emphasized the systematic application of linguistic and pedagogical knowledge. The reflective stage promoted critical thinking through analysis of outcomes, peer feedback, and self-assessment.

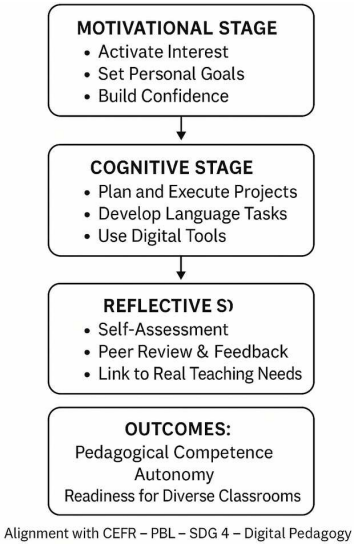

Figure 5. The motivational-cognitive-reflective model for training future english teachers

The implementation of this model began with the identification of thematic concerns relevant to students' future teaching contexts. During the motivational phase, faculty introduced real-life classroom scenarios, such as addressing mixed-ability learners or integrating environmental themes into lessons. These scenarios helped students visualize the practical application of their learning, stimulating curiosity and emotional investment. Engagement was further reinforced through collaborative brainstorming activities that allowed students to explore multiple approaches and negotiate instructional strategies collectively. The motivational phase proved particularly useful for students who had previously viewed teaching as a rigid and textbook-bound process. By reframing teaching as a dynamic and creative act, this phase set the tone for learner autonomy (Shaturaev & Khamitovna, 2023).

In the cognitive phase, participants were required to develop detailed lesson plans aligned with CEFR descriptors. They identified learning objectives, designed communicative tasks, selected materials, and created assessment rubrics. In doing so, they not only acquired technical skills but also practiced aligning pedagogical decisions with theoretical foundations. Faculty facilitated feedback sessions in which students defended their choices and received constructive critiques. This process enabled students to internalize principles such as scaffolding, differentiation, and student agency. Furthermore, it provided an opportunity to bridge linguistic theory with classroom pragmatics, an area often underdeveloped in traditional teacher education.

The reflective phase, which concluded each project cycle, was pivotal in transforming activity into learning. Students wrote structured reflections based on guiding prompts: What worked well? What would you change? What did you learn about your teaching style? These reflections were peer-reviewed and later discussed in guided feedback circles. In this phase, students recognized the iterative nature of teaching and became more comfortable with ambiguity and experimentation. Several noted in their reflections that "mistakes helped clarify misconceptions," signaling an important shift toward a growth mindset (Abduh et al., 2023; Medani & Sakti, 2022).

Beyond structured assignments, the model was reinforced through extracurricular activities such as "methodological clubs" and "mastery schools." These initiatives served as informal spaces where students could showcase their projects, engage in interdisciplinary discussions, and collaborate on problem-solving tasks beyond the formal curriculum. For instance, a student group

developed a mini project on English for tourism and conducted mock interviews with foreign visitors. Another team worked on environmental storytelling by integrating science vocabulary with English drama performances. These activities amplified students' motivation and expanded their awareness of how English could serve broader educational and civic purposes (Farida et al., 2024).

Moreover, Table 3 outlines observed behavioral changes in participants across the three stages of the model. During the motivational stage, curiosity and self-expression were dominant. In the cognitive stage, accuracy and critical questioning increased. In the reflective stage, metacognitive awareness and self-correction behaviors became more frequent. These qualitative changes reinforce the developmental trajectory promoted by the model and provide insight into the mechanisms behind its success.

Table 3. Behavioral Indicators across the motivational, cognitive, and reflective stages

PBL Stage	Observed Student Behaviors
Motivational Stage	- Expresses curiosity and willingness to participate- Shares personal goals and opinions- Shows excitement about project themes
Cognitive Stage	- Engages in active planning and task division- Uses references and digital tools for problem-solving- Justifies instructional choices with theory
Reflective Stage	- Provides self-assessment and peer feedback- Revises output based on critique- Describes learning process and personal growth

Interviews with faculty provided further validation of the model's impact. One instructor noted, "This is the first time students took ownership of their projects. They did not wait for instructions; they initiated." Another commented, "Their questions became deeper, less about grammar rules and more about learner needs." These testimonies suggest that the model not only shaped student performance but also transformed the culture of teaching and learning within these institutions. This cultural shift is essential if long-term, sustainable innovation is to occur.

Importantly, the model's success also depended on the systematic use of digital tools. While high-tech equipment was not uniformly available, students effectively used platforms such as Google Docs, YouTube, and Padlet to co-construct materials and deliver presentations. In a context where digital access is uneven, the strategic use of low-barrier tools offered both scalability and equity. Several students reported that using digital platforms helped them visualize abstract ideas and stay organized throughout the project cycle. In addition, online collaboration helped them manage group dynamics and workload distribution more efficiently (Haristiani & Rifa'i, 2020; Sanni, 2023).

The integration of these tools also prepared future teachers to navigate hybrid and online classrooms—skills that have become indispensable post-COVID-19. Through engagement with digital content creation, students acquired media literacy and adaptability, which are essential components of 21st-century teaching competencies. Furthermore, their ability to integrate technology responsibly aligns with the broader objectives of SDG 4 and ensures that their instructional practice remains relevant and inclusive (Fatawi et al., 2024; Oya, 2024).

To ensure quality control and consistency across different cohorts, a rubric was developed to evaluate student projects holistically. The rubric included criteria such as goal alignment, learner engagement, task authenticity, collaboration quality, use of language, and reflection depth. Table 4 shows the rubric framework, which was applied uniformly across institutions. This allowed for comparability and helped maintain high expectations for all participants, regardless of institutional differences.

Table 4. Rubric for evaluating pbl-based projects in english language teacher training

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Improvement (1)
Planning & Organization	Clear goals, timeline, and tasks; fully aligned with project outcomes	Goals and tasks mostly clear; minor issues in alignment	Incomplete goals/timeline; unclear task division	No clear plan; disorganized and misaligned
Content Accuracy	All content is relevant, well-supported, and pedagogically sound	Most content is accurate and relevant	Some content lacks clarity or relevance	Content is largely inaccurate or inappropriate
Creativity & Innovation	Demonstrates originality and strong integration of digital/media tools	Some originality and use of digital elements	Limited originality; relies on conventional methods	No evidence of creativity or innovation
Collaboration	Fully collaborative with balanced contributions and peer feedback integrated	Collaborative with minor imbalance in group roles	Unequal contributions; limited peer feedback	Minimal collaboration; dominated by one or few members
Reflective Component	Deep reflection on process and learning outcomes; shows personal growth	General reflection with some learning insights	Superficial reflection; limited insight	No meaningful reflection present
Presentation Quality	Professional presentation, well-structured, error-free	Clear presentation with few errors	Some structure issues or noticeable language problems	Poorly presented; lacks coherence and clarity

Faculty training also contributed to the fidelity of implementation. Instructors participated in orientation sessions where they reviewed the PBL model, examined sample projects, and rehearsed facilitation techniques. This training ensured that teachers were not merely observers but active facilitators in the learning process. It also fostered a community of practice among instructors, enabling them to share strategies, troubleshoot challenges, and align expectations. As a result, the professional development of faculty became both a prerequisite and an outcome of the model's implementation.

The results from this second stage confirm that a structured, phased approach to PBL enables future teachers to internalize complex pedagogical concepts through active engagement. The integration of motivational, cognitive, and reflective elements created a learning environment that was not only interactive but also transformative. Through this model, students evolved from passive recipients of knowledge to empowered educators-in-training capable of navigating diverse classroom scenarios. The impact of this shift extends beyond individual outcomes to the institutional level, promoting a sustainable culture of pedagogical innovation in line with national goals and global education frameworks.

Stengthening collaboration, critical thinking, and reflective practice

Table 5 presents selected excerpts from student reflection journals, illustrating the cognitive and emotional growth experienced throughout the PBL process. These reflections serve as qualitative evidence of the model's success in fostering learner agency, resilience, and

intellectual curiosity. Most students reported increased confidence in lesson planning, a stronger sense of collaboration, and a growing awareness of their pedagogical identity.

Table 5. Sample reflection excerpts from student journals on pbl experience

Theme	Reflection Excerpt
Personal Growth	"This project pushed me to leave my comfort zone. I never thought I could lead a group and manage deadlines."
Pedagogical Realization	"I realized that teaching is not just about explaining grammar. It's about creating learning experiences."
Collaboration Challenges	"It was difficult at first to agree with my teammates, but over time I learned how to listen and compromise."
Use of Technology	"Using Canva and Padlet made the lessons more attractive. I want to explore more tools like this."
Shifting Perspectives	"I used to believe traditional lectures were enough. Now I understand how student-centered methods work better."
Confidence Building	"At first I doubted myself. But after presenting our project, I felt proud and more ready to become a teacher."

The act of working in project teams not only improved students' linguistic performance but also cultivated essential soft skills such as negotiation, empathy, and collective decision-making. These qualities are vital in multilingual and multicultural classrooms, where teachers often must balance individual learner needs with curriculum demands. During project implementation, team members assumed various roles—researcher, presenter, designer, and editor—requiring them to communicate clearly, delegate effectively, and support one another's development. These interactions deepened their sense of interdependence and accountability, reinforcing the core scial values of modern pedagogy (Abduh et al., 2023; Arifiani et al., 2025).

Students also displayed a heightened ability to integrate feedback, one of the most overlooked but crucial skills in both teaching and learning. Throughout the project cycles, participants engaged in formative peer reviews, teacher-guided discussions, and self-assessments. Over time, their journal entries began to shift from descriptive to analytical, with statements such as "I realized I was focusing too much on grammar and ignoring student interaction" or "Our first plan failed because we didn't define our audience properly." These reflections point to a transition from superficial engagement to deep metacognition—an essential trait of reflective practitioners (Thomas & Rogers, 2020).

While the PBL model encouraged independent learning, it also promoted structured collaboration. Table 6 summarizes the differences in collaborative behaviors between the control and experimental groups. In the experimental group, behaviors such as role rotation, consensus-building, and shared reflection were more frequently observed and reported. These collaborative dimensions are particularly significant given the collectivist educational culture in Uzbekistan, where peer support and group achievement are traditionally valued. The PBL framework provided a modern reinterpretation of these cultural values within an academically rigorous structure.

Table 6. Comparison of collaborative behavior indicators in control and experimental groups

Behavioral Indicator	Control Group (Traditional Approach)	Experimental Group (PBL-Based Approach)
Task Division	Tasks often assigned by instructor; limited group autonomy	Students negotiate and assign tasks independently

Peer Interaction	Minimal; mostly individual work or instructor-led dialogue	Frequent peer discussion, idea exchange, and cooperative feedback
Conflict Resolution	Conflicts avoided or unresolved; little negotiation	Conflicts addressed through dialogue and consensus
Responsibility Sharing	Uneven participation; some students dominate or disengage	Balanced involvement; shared accountability across team members
Collective Decision-Making	Decisions made individually or by leader	Decisions made collaboratively after group deliberation
Engagement in Group Activities	Passive participation in group activities	Active and enthusiastic involvement in all group tasks

Another notable outcome of this study was the expansion of students' content knowledge through inquiry-based tasks. By investigating themes such as environmental protection, inclusive education, and cultural identity, students were encouraged to synthesize subject-matter content with language objectives. This interdisciplinary approach led to a more contextualized understanding of English, enabling learners to teach beyond textbook materials. Several projects involved field interviews, multimedia integration, or creative storytelling, formats that connected classroom content with students' lived experiences. This experiential grounding of language education reflects Dewey's principle of learning through doing and strengthens the relevance of English as a tool for global citizenship (Rahmadani et al., 2024).

Moreover, the PBL model supported the emergence of leadership qualities among students. As they moved through cycles of planning, implementation, and reflection, individuals naturally began to assume leadership roles within their groups, coordinating tasks, mentoring peers, and guiding discussions. These roles were not assigned but emerged organically, indicating the empowering nature of the learning environment. Leadership was not tied to academic achievement but to initiative, communication, and reliability, which mirrors the democratic ethos embedded in 21st-century education.

The cumulative effect of these experiences reshaped students' perceptions of teaching. Previously seen as a fixed and teacher-centered profession, teaching came to be viewed as an adaptive, collaborative, and learner-responsive practice. Students expressed excitement about designing their materials, incorporating technology, and analyzing classroom problems from multiple perspectives. These new attitudes are critical in helping future English teachers sustain their motivation and evolve in response to diverse classroom demands (Sidik & Masek, 2021).

Table 7 captures the conceptual transformation in students' understanding of teaching, based on a coding of pre- and post-intervention reflections. The table shows a clear movement from rigid, authoritative views of instruction to dynamic, constructivist perspectives. Notably, many students began to use terms such as "facilitator," "designer," and "coach" to describe the teacher's role, indicating a pedagogical shift in identity.

Table 7. Shift in students' conceptualization of teaching roles before and after pbl

Teaching Role Dimension	Before PBL (Traditional View)	After PBL (Transformed View)
Role of the Teacher	Knowledge transmitter; primary source of information	Facilitator; guide for student-driven discovery and exploration
Role of the Student	Passive receiver; follows instructions	Active participant; co-creator of learning experiences
Classroom Authority	Teacher-centered, strict control	Shared responsibility; collaborative management

Assessment Approach	Focus on correct answers and summative tests	Emphasis on process, creativity, reflection, and formative feedback
Use of Materials and Media	Textbook-based; limited integration of technology	Rich multimodal tools; student-selected and created resources
Instructional Design Mindset	One-size-fits-all; content coverage focused	Adaptive and learner-centered; responsive to student needs

Despite these positive outcomes, the study also revealed several challenges. Some students struggled with role ambiguity in teams or had difficulty balancing academic workload with project timelines. Others required additional guidance in using technology, especially in rural campuses where access was limited. These challenges underscore the need for ongoing scaffolding, faculty support, and institutional investment in infrastructure. However, these barriers did not diminish the overall effectiveness of the PBL model. On the contrary, they provided valuable learning moments that mirrored the unpredictable nature of real classroom teaching (Fiandini et al., 2024; Rahayu et al., 2024).

To mitigate these issues, faculty adjusted the pacing of project phases and incorporated digital training sessions at the start of the intervention. Peer mentoring was also introduced to support students with lower confidence or technical skills. These adaptive measures reflect the flexibility of the PBL framework and its potential to evolve based on context. This adaptability is crucial for broader implementation across teacher education institutions in Uzbekistan and similar settings worldwide (Haristiani & Rifa'i, 2020; Sanni, 2023).

In sum, this third phase of analysis highlights the role of PBL in nurturing reflective, collaborative, and critical-minded educators. It validates the theoretical foundations of the motivational-cognitive-reflective model while offering practical evidence of behavioral, cognitive, and affective growth among pre-service English teachers. These findings align with the aims of SDG 4 by demonstrating how innovation in pedagogy can elevate both the quality and equity of teacher preparation (Ragadhita et al., 2026). This adds new information regarding SDGs as reported elsewhere (Nurramadhani et al., 2024; Krishnan et al., 2024; Djirong et al., 2024; Waardhani et al., 2025; Yustiarini et al., 2025; Mezouki et al., 2025; Glovatskii et al., 2025).

Implication for teacher education and sustainable development

The accumulated results from the diagnostic, formative, and reflective phases underscore the transformative capacity of project-based learning in preparing future English teachers. The integration of the motivational-cognitive-reflective model not only improved technical competencies such as lesson planning, language assessment, and task design but also facilitated the development of essential 21st-century skills, including collaboration, problem-solving, and critical reflection. These gains demonstrate that PBL is not merely a teaching technique but a holistic educational framework that equips learners to thrive in diverse and evolving classroom environments (Abduh et al., 2023).

In particular, the experimental group exhibited significant improvements in areas such as self-directed learning, teamwork, and digital competence—three competencies increasingly demanded in both national and international teaching contexts. The capacity to adapt instruction to student needs, design authentic materials, and engage in reflective dialogue positions these pre-service teachers to become agents of change within their schools and communities. This outcome is particularly aligned with the goals of Uzbekistan's national education reforms, which emphasize the modernization of pedagogical practices and alignment with global standards.

Table 8 consolidates key impacts of the model across four dimensions: pedagogical competence, technological integration, collaborative behavior, and reflective thinking. The

greatest gains were noted in the development of reflective teaching practices and integration of digital tools to support language learning. These findings are consistent with global literature on PBL and confirm its value as a cross-cutting innovation in teacher education.

Table 8. Summary of competency gains across four dimensions in experimental group

Competency Dimension	Pre-Project Level	Post-Project Level	Observed Improvement
Pedagogical Knowledge	Basic understanding of teaching concepts	Applied knowledge in designing contextual tasks	Improved ability to link theory with practice
Digital Literacy	Limited use of educational tools	Confident use of various digital platforms	Increased fluency with multimedia and e-learning resources
Collaborative Skills	Passive group involvement	Active, constructive participation	Greater responsibility-sharing and team engagement
Reflective Thinking	Rare or superficial self-evaluation	Regular reflective journaling and peer feedback	Deeper awareness of teaching process and personal growth trajectory

Moreover, the study holds considerable implications for educational policy and curriculum development. Given its empirical foundation and scalability, the model can be formally adopted within pre-service teacher education curricula as a core methodology for pedagogical training. Institutions could embed PBL in coursework related to microteaching, practicum, instructional design, or material development. Doing so would provide a cohesive and immersive learning experience that reflects real-world teaching demands.

Faculty development also emerges as a necessary and parallel component of PBL implementation. While students responded positively to collaborative and inquiry-based tasks, the sustainability of such models depends heavily on instructor preparedness. Regular workshops, learning communities, and peer observation protocols could help educators build confidence and consistency in facilitating project-based approaches. Such structures would also allow institutions to institutionalize innovation, rather than treating it as an isolated or experimental initiative.

Importantly, the model has the potential to advance Sustainable Development Goal 4 by supporting equitable, inclusive, and quality education through innovation. PBL can serve as a vehicle to close the gap between urban and rural teacher education programs by offering structured frameworks that rely more on student creativity and collaboration than on expensive resources. In contexts where internet bandwidth or classroom technology is limited, low-tech adaptations such as printed project journals, peer teaching, or community-based inquiries can still achieve high-impact outcomes when guided by a solid pedagogical model (Haristiani & Rifa'i, 2020; Sanni, 2023).

Furthermore, the inclusion of real-world problems within the PBL framework creates space for values-based education, where issues such as sustainability, diversity, inclusion, and global awareness become integral to language learning. This approach transforms English from a subject of memorization into a medium for civic engagement and personal development. For example, student projects in this study addressed themes like environmental protection, gender equality, and educational access—all core elements of the SDG framework. Embedding such topics in teacher training ensures that future educators are not only language experts but also advocates for social justice and sustainable development (Farida et al., 2024; Fatawi et al., 2024).

Finally, Figure 6 presents a conceptual model of systemic integration of PBL into teacher education institutions. It illustrates the vertical and horizontal linkages needed among curriculum, assessment, faculty development, institutional leadership, and digital infrastructure. The model emphasizes that successful adoption of PBL requires coherence across administrative, pedagogical, and technological domains.

In closing, the study confirms that project-based learning, when structured through a motivational-cognitive-reflective lens, can substantially elevate the quality of English language teacher preparation. The model's adaptability, emphasis on student-centered learning, and alignment with national and global goals make it an ideal candidate for widespread implementation. The combination of statistical validation, narrative insight, and policy relevance presents a compelling case for curriculum reform and pedagogical innovation in higher education.

The next steps involve longitudinal tracking of program graduates, expansion of the model to other disciplines (e.g., mathematics, science, social studies), and international collaboration to adapt and refine the framework across diverse cultural contexts. These efforts will further strengthen the evidence base and solidify the role of PBL as a catalyst for achieving high-impact, future-ready teacher education in Uzbekistan and beyond.

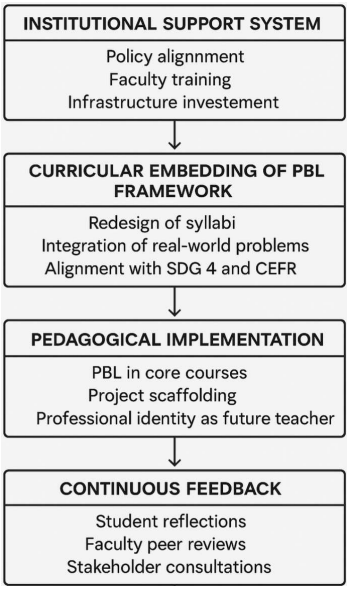

Figure 6. Systemic integration model for scaling pbl in teacher education institutions

Conclusion

This study developed and validated a motivational-cognitive-reflective model for integrating project-based learning into English teacher education. The model significantly improved competencies in planning, collaboration, reflection, and technology use. Through experiential and student-centered approaches, future teachers gained practical readiness for diverse classrooms. The model supports curriculum innovation and contributes to Sustainable Development Goal 4 by promoting quality, inclusive, and adaptable teacher preparation. Its scalable structure makes it applicable across institutions and disciplines, offering a transformative path for 21st-century pedagogical reform.

Declaration of conflicting interest
The authors declare that there is no conflict of interest in this work.

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