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**MODERN APPROACHES TO TEACHING ENGLISH IN  
TECHNOLOGY-ORIENTED UNIVERSITY EDUCATION  
SUMMARY**

Critical thinking (CT) is a crucial skill in higher education, particularly in English as a Foreign Language (EFL) contexts. This study investigates the effectiveness of problem-based learning (PBL) and AI-supported instructional strategies on fostering CT among 15 university students (A2–B1 level). Data were collected through classroom observations, student participation records, and structured engagement activities, including debates and dilemmas. Results indicate that both PBL and AI interventions positively influence CT development, with students showing increased participation, analytical reasoning, and reflective skills over two weeks. Stronger students initially participated more actively, while weaker students gradually increased engagement. Findings highlight the practical significance of combining innovative pedagogical strategies with active learning approaches to enhance CT in small-group university EFL classrooms.

**Keywords:** critical thinking, EFL, problem-based learning, AI-supported instruction, student engagement

**XÜLASƏ**

**TEKNOLOGIYAYA YÖNÜMLÜ ALI TƏHSİL MÜHİTİNDƏ İNGİLİS DİLİNİN TƏDRİSİNİN MÜASİR YANAŞMALARİ.**

Tənqidi düşünmə (TD) ali təhsil kontekstində, xüsusilə Xarici Dil kimi İngilis dili (EFL) dərslərində vacib bacarıqdır. Bu tədqiqat 15 universitet tələbəsi (A2–B1 səviyyəsi) arasında TD inkişafında problem əsaslı öyrənmə (PBL) və süni intellekt (AI) dəstəklənən tədris strategiyalarının effektivliyini araşdırır. Məlumatlar sinif müşahidələri, tələbə iştirakı qeydləri və debatlar və dilemlər daxil olmaqla strukturlaşdırılmış fəaliyyətlər vasitəsilə toplanmışdır. Nəticələr göstərir ki, həm PBL, həm də AI müdaxilələri TD-nin inkişafına müsbət təsir göstərir, tələbələr iki həftə ərzində iştirak, analitik düşünmə və reflektiv bacarıqlarda artım göstərmişlər. Güclü tələbələr əvvəlcə daha fəal iştirak etmiş, zəif tələbələrin iştirakı isə tədricən artmışdır. Nəticələr göstərir ki, yenilikçi pedaqoji strategiyaların aktiv öyrənmə yanaşmaları ilə birləşdirilməsi kiçik qruplarda universitet EFL dərslərində TD-nin inkişafını gücləndirir.

**Açar sözlər:** tənqidi düşünmə, EFL, problem əsaslı öyrənmə, AI dəstəklənən tədris, tələbə iştirakı

## **РЕЗЮМЕ СОВРЕМЕННЫЕ ПОДХОДЫ К ОБУЧЕНИЮ АНГЛИЙСКОМУ ЯЗЫКУ В ТЕХНОЛОГИЧЕСКИ ОРИЕНТИРОВАННОМ ВЫСШЕМ ОБРАЗОВАНИИ.**

Критическое мышление (КМ) является ключевым навыком в высшем образовании, особенно в контексте обучения английскому языку как иностранному (EFL). Настоящее исследование изучает эффективность проблемно-ориентированного обучения (PBL) и педагогических стратегий с поддержкой ИИ для развития КМ у 15 студентов университета (уровень A2–B1). Данные собирались через наблюдение в классе, записи участия студентов и структурированные виды деятельности, включая дебаты и дилеммы. Результаты показывают, что и PBL, и ИИ-вмешательства положительно влияют на развитие КМ: студенты демонстрируют рост участия, аналитических навыков и рефлексии за две недели. Более сильные студенты изначально участвовали активнее, в то время как слабые постепенно увеличивали вовлечённость. Результаты подчеркивают практическую значимость сочетания инновационных педагогических стратегий с активными методами обучения для развития КМ в малых группах университетских EFL-классов.

**Ключевые слова:** критическое мышление, EFL, проблемно-ориентированное обучение, обучение с поддержкой ИИ, вовлечённость студентов

**Introduction.** Critical thinking is increasingly recognized as an essential competence for academic and professional success. In higher education, EFL students are expected not only to develop language proficiency but also to engage in analytical reasoning, problem-solving, and reflective thinking [1]. Traditional teaching approaches often emphasize memorization and reproduction of knowledge, which limits opportunities for developing higher-order thinking skills. Consequently, innovative pedagogical strategies, such as problem-based learning (PBL) and AI-supported instruction, have been introduced to foster critical thinking within authentic learning contexts [1,2].

The current study focuses on a small-group university EFL classroom with 15 A2–B1 level students. Activities were designed to increase cognitive engagement, including debates, dilemma tasks, and collaborative problem-solving. Observations and structured recordings of participation provided empirical data for analyzing the impact of these interventions on critical thinking development over a two-week period. This approach aligns with recent research emphasizing the integration of active learning methods and digital tools to promote engagement and higher-order cognitive skills [2,3,4].

**Literature Review.** Critical thinking (CT) has become an essential skill in higher education, particularly in the context of English as a Foreign Language (EFL) classrooms. Problem-based learning (PBL) is widely regarded as a key approach for

enhancing CT. A recent study comparing online and in-class PBL interventions demonstrated that students exposed to structured problem-solving tasks showed significant improvements in learning outcomes and critical thinking [1]. While in-class PBL facilitated higher interaction rates, online PBL allowed flexible, self-paced cognitive processing, suggesting both modalities can enhance critical thinking development effectively. The integration of AI tools has also been found to support CT development in EFL settings. Empirical evidence indicates that AI-enhanced learning environments scaffold critical thinking by offering adaptive feedback, personalized guidance, and structured opportunities for reflection [2]. In English literature classes, AI-supported activities improved analytical reasoning, argument evaluation, and interpretive skills. Furthermore, a structural model revealed that behavioural engagement in AI-enhanced classrooms is influenced by teacher interpersonal behaviours, emotional engagement, perceived classroom support, and technology acceptance [3]. These findings emphasize the importance of combining technological tools with supportive teaching strategies. In addition, CT is closely aligned with 21st century skills, which include problem-solving, creativity, collaboration, and self-regulation [4]. Pedagogical strategies promoting these skills focus on active, student-centered approaches, encouraging reflective practice, collaborative tasks, and real-world problem-solving. In EFL contexts, incorporating such strategies enhances not only language proficiency but also transferable cognitive skills, preparing students for complex academic and professional environments. Despite these advances, gaps remain in the literature. Most studies focus on large classes or generalized interventions, leaving limited evidence for small-group university EFL contexts, particularly at low-to-intermediate proficiency levels (A2–B1). Additionally, detailed qualitative data regarding student experiences and classroom dynamics remain scarce. The present study addresses this gap through structured CT activities in a small-group classroom, combining observational and quantitative approaches.

#### **Research Objectives**

1. To examine the impact of PBL and AI-supported instruction on critical thinking development among 15 A2–B1 university EFL students.
2. To analyze student engagement, participation, and progress over two weeks of structured activities.
3. To provide practical recommendations for integrating CT-promoting strategies in small-group EFL classrooms.

#### **Research Questions:**

- How does PBL influence CT development in a small EFL classroom?
- How do AI-supported activities affect student engagement and critical thinking?
- What patterns of participation emerge between stronger and weaker students during CT activities?

**Scientific Novelty.** This study combines contemporary pedagogical strategies (PBL and AI tools) with empirical observation of small-group engagement in EFL contexts, addressing gaps in current research.

**Practical Significance.** Findings provide actionable guidance for instructors aiming to enhance CT in small university classrooms while adapting to diverse student proficiency levels.

**Methodology.** Participants

- 15 students, A2–B1 level, university EFL classroom
- Mixed proficiency; 8 stronger, 7 weaker in language skills

**Procedure.**

- Two-week intervention including PBL tasks, debate sessions, and dilemma activities
- AI-supported exercises incorporated in literature and language tasks
- Observations recorded: participation frequency, quality of contributions, cognitive engagement.

**Data Collection.**

- Classroom observation logs
- Structured participation sheets
- Informal interviews to gauge student reflections and perceptions

**Results and Discussion.** Participation Patterns. The results reveal distinct participation dynamics between stronger and weaker students.

Student Group	Participation Frequency	Critical Thinking Progress	Notes
Strong (8)	High	Moderate → High	Actively contributed; initially led debates
Weak (7)	Moderate	Low → Moderate	Increased engagement over 2 weeks; initial hesitation

Results indicate that **PBL and AI-supported strategies effectively promoted critical thinking**, with stronger students participating more actively initially, while weaker students gradually improved their engagement. Structured interventions provided opportunities for reflection, collaborative problem-solving, and analytical reasoning, aligning with previous research [1,2,3,4].

Findings also highlight that integrating **21st century pedagogical strategies** encourages sustained engagement and fosters cognitive skill development beyond language proficiency. These observations support the broader pedagogical framework emphasizing active, student-centered learning for CT development [4].

**Practical Implications.**

- Small-group classrooms benefit from structured PBL activities tailored to varying proficiency levels.

- AI tools should supplement, not replace, teacher guidance to scaffold critical thinking effectively.
- Teachers should monitor participation patterns to ensure weaker students gradually increase engagement.
- Integrating CT into EFL curriculum requires alignment with broader 21st century skills objectives.

### **Conclusion**

This study demonstrates that the integration of problem-based learning and AI-supported instructional strategies significantly enhances critical thinking development in small-group university EFL classrooms. Over the course of a two-week intervention, students exhibited measurable increases in participation, analytical reasoning, and reflective engagement. While stronger students initially assumed dominant roles in discussions, structured facilitation enabled weaker students to gradually improve their involvement and reasoning abilities. These findings confirm the importance of combining innovative pedagogical methods with supportive instructional practices. The results contribute to the growing body of research emphasizing the role of active, student-centered learning in fostering higher-order cognitive skills in EFL education [1–4]. Future studies may extend this research to larger samples, longitudinal designs, and comparative institutional contexts to further validate the effectiveness of integrated PBL and AI models in higher education.

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