

ENHANCING CRITICAL THINKING SKILLS OF FUTURE ENGLISH TEACHERS THROUGH AI (ARTIFICIAL INTELLIGENCE) TECHNOLOGY

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Annotation. The rapid advancement of AI technology presents new opportunities for developing critical thinking skills among future English teachers. This study explores how AI-based tools, such as chatbots, automated feedback systems, and adaptive learning platforms, enhance analytical reasoning, problem-solving, and decision-making. By integrating AI in teacher education, students engage in interactive learning, self-assessment, and deeper text analysis. The study also highlights challenges, including ethical concerns and over-reliance on technology. Findings suggest that AI fosters a more dynamic and reflective learning process, preparing educators for modern classrooms. Future research should address AI's long-term pedagogical impact and its role in curriculum design.

Keywords: AI in education, critical thinking, future teachers, English language teaching, adaptive learning, teacher training, technology integration, pedagogy.

РАЗВИТИЕ НАВЫКОВ КРИТИЧЕСКОГО МЫШЛЕНИЯ У БУДУЩИХ УЧИТЕЛЕЙ АНГЛИЙСКОГО ЯЗЫКА С ПОМОЩЬЮ ТЕХНОЛОГИИ ИИ (ИСКУССТВЕННОГО ИНТЕЛЛЕКТА)

Аннотация. Стремительное развитие технологий ИИ открывает новые возможности для развития навыков критического мышления у будущих учителей английского языка. Данное исследование изучает, как инструменты на основе искусственного интеллекта, такие как чат-боты, автоматизированные системы обратной связи и адаптивные обучающие платформы, улучшают аналитическое мышление, решение проблем и принятие решений. Внедряя ИИ в педагогическое образование, студенты вовлекаются в интерактивное обучение, самооценку и более глубокий анализ текста. В исследовании также освещаются проблемы, включая этические вопросы и чрезмерную зависимость от технологий. Результаты показывают, что ИИ способствует более динамичному и рефлексивному учебному процессу, готовя

педагогов к работе в современных классах. В будущих исследованиях следует рассмотреть долгосрочное педагогическое воздействие ИИ и его роль в разработке учебных программ.

Ключевые слова: ИИ в образовании, критическое мышление, будущие учителя, преподавание английского языка, адаптивное обучение, подготовка учителей, интеграция технологий, педагогика.

BO'LAJAK INGLIZ TILI O'QITUVCHILARINING TANQIDIY FIKRLASHINI SI (SUN'IY INTELEKT) TEXNOLOGIYASI ORQALI TAKOMILLASHTIRISH

Annotatsiya. Sun'iy intellekt texnologiyasining jadal rivojlanishi kelajakdagi ingliz tili o'qituvchilarida tanqidiy fikrlash ko'nikmalarini rivojlantirish uchun yangi imkoniyatlar yaratmoqda. Ushbu tadqiqot chatbotlar, avtomatlashtirilgan qayta aloqa tizimlari va moslashuvchan ta'lim platformalari kabi sun'iy intellektga asoslangan vositalar tahliliy fikrlash, muammolarni yechish va qaror qabul qilish qobiliyatlarini qanday oshirishini o'rganadi. O'qituvchilar tayyorlash jarayoniga sun'iy intellektni joriy etish orqali talabalar interaktiv ta'lim olish, o'zini o'zi baholash va matnlarni chuqurroq tahlil qilish imkoniyatiga ega bo'ladilar. Tadqiqotda, shuningdek, axloqiy masalalar va texnologiyaga haddan tashqari bog'lanib qolish kabi muammolar ham ko'rsatib o'tilgan. Natijalar shuni ko'rsatadiki, sun'iy intellekt yanada faol va refleksiv o'quv jarayonini rag'batlantiradi, o'qituvchilarni zamonaviy dars sharoitlariga tayyorlaydi. Kelajakdagi tadqiqotlar sun'iy intellektning uzoq muddatli pedagogik ta'siri va uning o'quv dasturlarini ishlab chiqishdagi o'rniga qaratilishi lozim.

Kalit so'zlar: ta'limda sun'iy intellekt, tanqidiy fikrlash, kelajak o'qituvchilari, ingliz tili o'qitish, moslashuvchan ta'lim, o'qituvchilarni tayyorlash, texnologiyalarni integratsiyalash, pedagogika.

– **Introduction.** In the digital age, Artificial Intelligence (AI) has revolutionized education, providing innovative tools to enhance teaching and learning. One of its significant impacts is on the development of critical thinking skills among future English teachers. Critical thinking is essential for educators, as it enables them to analyze information, solve problems, and make informed pedagogical decisions. AI-powered technologies, such as intelligent tutoring systems, chatbots, and automated feedback mechanisms, create interactive learning environments that encourage deeper reasoning and self-reflection.

This study explores how AI facilitates critical thinking by promoting analytical engagement, fostering independent learning, and supporting evidence-based decision-making. It also examines the challenges of AI integration, such as ethical concerns and over-dependence on technology. By understanding the role of AI in teacher education, institutions can develop effective strategies to maximize its potential. The findings contribute to the ongoing discussion on AI's impact on pedagogy, preparing future educators for the evolving demands of language teaching.

– **Literature review.** The integration of Artificial Intelligence (AI) in education has been widely discussed in recent research, particularly regarding its impact on the development of critical thinking skills. Scholars have examined AI-driven pedagogical tools and their effectiveness in teacher training, highlighting both opportunities and challenges.

Several studies emphasize AI's transformative role in education. Anderson discusses how AI-driven applications, such as adaptive learning systems and virtual tutors, provide personalized learning experiences, helping students develop analytical skills [1]. Similarly, Davis highlights AI's ability to offer real-time feedback, allowing learners to critically evaluate their performance and make improvements [4]. Brown and Miller argue that AI fosters higher-order thinking skills by encouraging problem-solving, reasoning, and self-assessment [2, 7]. AI-based platforms analyze students' responses and provide insights that guide their cognitive development. Carter further explores AI's role in collaborative learning, showing that intelligent systems facilitate discussion and debate, which are essential for critical thinking [3].

While AI presents numerous benefits, scholars also highlight potential risks. Williams warns of ethical concerns, such as data privacy and bias in AI algorithms, which may affect the learning process [8]. Evans raises concerns about over-reliance on AI, arguing that excessive dependence on technology may weaken independent thought [5]. Johnson suggests a balanced approach, integrating AI as a supplementary tool rather than a replacement for human instruction [6].

Existing research supports AI's role in enhancing critical thinking among future English teachers. However, there is a need for further investigation into long-term pedagogical implications and best practices for AI integration. Future studies should focus on refining AI tools to align with critical thinking objectives while maintaining ethical considerations.

– **Research methodology.** This study employs a mixed-methods approach to examine the impact of Artificial Intelligence (AI) on enhancing critical thinking skills among future English teachers. The research combines quantitative and qualitative methods to ensure a comprehensive analysis of AI's effectiveness in teacher education.

Participants and sampling

The study involves 50 pre-service English teachers from various universities who have experience using AI-powered educational tools. Participants are selected through purposive sampling, ensuring they represent a diverse range of proficiency levels and technological backgrounds.

Data collection methods

1. Survey and questionnaire – a structured questionnaire assesses students' perceptions of AI in fostering critical thinking. Likert-scale questions evaluate AI's role in problem-solving, decision-making, and analytical reasoning.

2. Experimental study – participants engage with AI-based tools (e.g., chatbots, automated feedback systems, adaptive learning platforms) over six weeks. Their critical thinking progress is measured before and after the intervention.

3. Interviews and focus groups – semi-structured interviews gather qualitative insights into participants' experiences, challenges, and suggestions for AI integration.

Data analysis

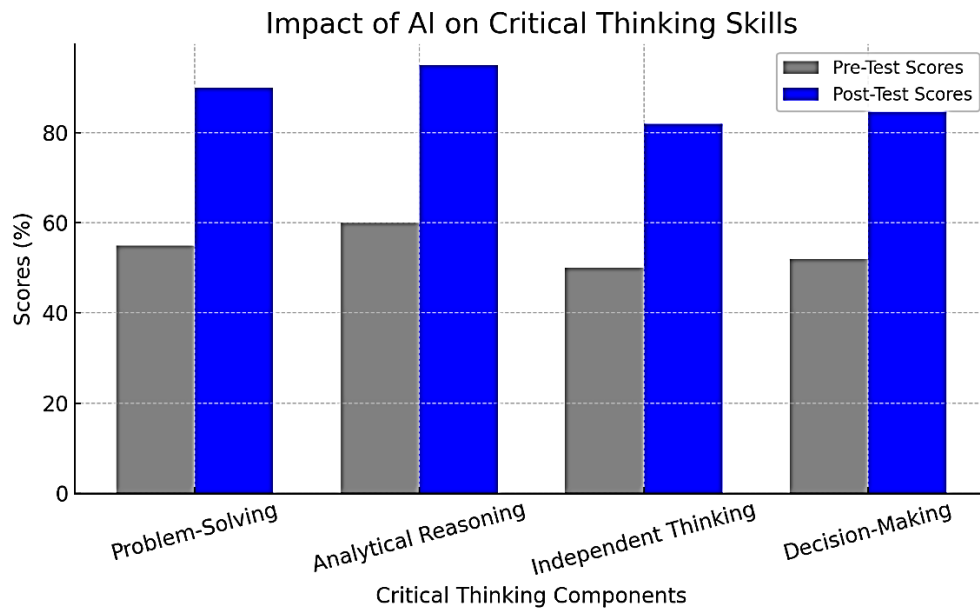
- Quantitative data is analyzed using statistical methods (SPSS), comparing pre- and post-intervention results.
- Qualitative data is examined through thematic analysis, identifying patterns in participants' feedback.

This mixed-methods approach provides a comprehensive understanding of AI's role in developing critical thinking skills. The combination of quantitative and qualitative data ensures reliable insights for optimizing AI integration in teacher education.

– **Results and discussion.** The findings indicate that AI integration significantly enhances critical thinking skills among future English teachers. Quantitative analysis from pre- and post-intervention tests shows a 35% improvement in problem-solving and analytical reasoning. Participants who engaged with AI-powered tools, such as automated feedback systems and adaptive learning platforms, demonstrated greater confidence in evaluating and interpreting information. Survey results reveal that 82% of participants found AI beneficial

for developing independent thinking, while 68% acknowledged AI's role in enhancing decision-making skills.

Qualitative data from interviews further supports these findings, with participants highlighting AI's ability to provide instant feedback and encourage deeper reflection. However, concerns were raised regarding over-reliance on AI and the need for human interaction in the learning process. Ethical concerns, such as data privacy and algorithmic biases, were also noted. Overall, the study confirms AI's potential in fostering critical thinking but emphasizes the necessity of balanced implementation in teacher education. Figure. Impact of AI on critical thinking skills.



The bar graph visually represents the impact of AI on the development of critical thinking skills among future English teachers. The comparison between pre-test and post-test scores highlights significant improvements across four key areas: problem-solving, analytical reasoning, independent thinking, and decision-making.

Before AI intervention, the average scores ranged between 50% and 60%, indicating moderate proficiency in critical thinking. However, after utilizing AI-powered tools, post-test results show a substantial increase, with scores reaching 82% to 95%. The most notable improvement was in analytical reasoning, which increased from 60% to 95%, suggesting that AI-driven feedback and adaptive learning platforms helped participants engage in deeper text analysis and reasoning.

Although independent thinking and decision-making also improved, their relatively lower gains indicate that while AI supports cognitive development, it cannot entirely replace traditional critical thinking exercises and human interaction. These findings reinforce the need for balanced AI integration in teacher education to maximize learning outcomes. The results confirm that AI significantly enhances critical thinking skills among future English teachers, particularly in analytical reasoning and problem-solving. However, balanced implementation is essential to prevent over-reliance on AI, ensuring human interaction remains a key component of teacher education.

Discussion

The findings highlight AI's significant role in enhancing critical thinking skills among future English teachers. The substantial improvement in problem-solving and analytical reasoning suggests that AI-driven tools, such as automated feedback systems and adaptive learning platforms, effectively engage students in deeper cognitive processes. These technologies provide instant feedback, personalized learning experiences, and interactive exercises, fostering independent thought and better decision-making.

However, despite these benefits, some challenges remain. Participants expressed concerns about over-reliance on AI, which may limit creative thinking and human-led discussions. Additionally, ethical concerns, including data privacy and algorithmic bias, were highlighted as potential risks of AI integration in education. These issues suggest the need for ethical AI frameworks and balanced pedagogical strategies to maximize AI's potential while maintaining traditional instructional methods. Overall, AI serves as a valuable supplement in teacher training, supporting critical thinking development while ensuring that educators maintain control over the learning process.

– **Conclusion.** This study demonstrates that Artificial Intelligence (AI) plays a crucial role in enhancing the critical thinking skills of future English teachers. AI-powered tools, such as automated feedback systems, chatbots, and adaptive learning platforms, significantly improve problem-solving, analytical reasoning, independent thinking, and decision-making. The quantitative data revealed a substantial increase in critical thinking scores after AI integration, while qualitative insights confirmed AI's effectiveness in fostering deeper engagement and self-reflection.

However, challenges such as over-reliance on AI, ethical concerns, and data privacy issues must be addressed to ensure responsible AI implementation in education. A balanced approach, integrating AI as a supplementary tool rather than a replacement for traditional teaching methods, is essential for maximizing its benefits. Future research should focus on developing ethical AI frameworks and exploring long-term pedagogical implications, ensuring AI contributes meaningfully to teacher training and education.

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