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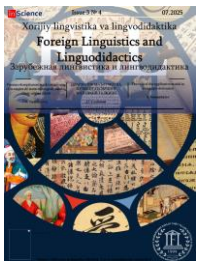

Towards cognitive skill development via generative AI: possibility or pedagogical illusion?

Maftuna RUZIEVA[1]

Navoiy State University

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ABSTRACT

Generative artificial intelligence (AI), especially large language models (LLMs), has become one of the most transformative yet debated innovations in education. Advocates contend that AI can act as a strong cognitive scaffold, providing personalized feedback and encouraging higher-order thinking. Critics, however, warn about superficial engagement, cognitive offloading, and algorithmic biases that could weaken deeper learning. This paper explores whether generative AI can genuinely support the development of cognitive skills in English as a Foreign Language (EFL) education. Using Vygotsky's sociocultural theory and Bloom's taxonomy, it investigates how AI-facilitated Socratic dialogue, reflective learning logs, and genre transformation tasks can promote analytical reasoning, metacognitive awareness, and skill transfer. However, risks like "illusory facilitation" and digital inequalities highlight the importance of careful pedagogical integration. By incorporating AI into reflective practices, critical questioning, and peer collaboration, teachers can turn it from a passive tool into a proactive partner in fostering independent, critical, and socially responsible learners.

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Sun'iy intellekt yordamida kognitiv ko'nikmalarni rivojlantirish sari: imkoniyat yoki pedagogik illyuziya?

Kalit so'zlar:
Sun'iy intellekt
Vositalari,
tafakkur ko'nikmalari,

ANNOTATSIYA

So'nggi yillarda sun'iy intellekt vositalari, xususan yirik til modellari, ta'lim jarayonida innovatsion yondashuv sifatida keng muhokama qilinmoqda. Tadqiqotchilar bunday

[1] Doctoral student, Navoiy State University

chet tilini o‘qitish,
o‘z-o‘zini boshqarish,
tanqidiy mulohaza,
tahliliy o‘qitish,
bilimlarni yangi vaziyatlarda tatbiq etish,
raqamli ta’lim texnologiyalari,
tenglik masalalari.

texnologiyalarning o‘quvchilarda tahliliy tafakkurni rivojlantirish, o‘z fikrlash jarayonini nazorat qilish ko‘nikmalarini shakllantirish hamda o‘rgangan bilimlarni yangi vaziyatlarda qo‘llash salohiyatini alohida ta’kidlamoqda. Jumladan, sokratik suhbatlar, o‘quvchi tomonidan yuritiladigan kuzatuv daftarlari va matn janrini o‘zgartirishga asoslangan topshiriqlar sun’iy intellekt vositalari yordamida o‘quvchilarni chuqur mulohaza yuritishga va yuqori darajadagi tafakkurni rivojlantirishga undaydi. Shu bilan birga, yuzaki o‘zlashtirish, aqliy yukni sun’iy tizimlarga o‘tkazib yuborish va algoritmlardagi noxolislik kabi xavf-xatarlar ham mavjud bo‘lib, bu texnologiyalarni o‘qitish jarayoniga puxta va tanqidiy yondashuv asosida integratsiya qilish zarurligini ko‘rsatadi. Ushbu maqolada sun’iy intellekt vositalarining imkoniyatlari L.S. Vygotskiyning ijtimoiy-madaniy yondashuvi va B. Blum tasnifi asosida tahlil qilinib, ularning ingliz tilini chet tili sifatida o‘rgatishda tafakkur va o‘z-o‘zini boshqarish ko‘nikmalarini rivojlantirishdagi o‘rni baholanadi. Maqolada sun’iy intellekt vositalaridan ta’lim jarayonida tanqidiy mulohaza, hamkorlik va o‘z faoliyatini tahlil qilishga asoslangan pedagogik yondashuv orqali samarali o‘quv muhitini yaratishda foydalanish imkoniyatlarini asoslab berilgan.

К развитию когнитивных навыков с помощью генеративного ИИ: возможность или педагогическая иллюзия?

Ключевые слова:
Генеративный искусственный интеллект,
когнитивные навыки,
обучение языкам,
метакогниция,
критическое мышление,
рефлексивная педагогика,
перенос знаний,
образовательные технологии,
обучение с ИИ,
цифровая грамотность.

АННОТАЦИЯ

Генеративный искусственный интеллект (ИИ), в частности крупные языковые модели (Large Language Models, LLMs), стал одним из самых преобразующих и одновременно спорных нововведений в сфере образования. Сторонники утверждают, что ИИ может выступать в роли мощного когнитивного каркаса, предоставляя персонализированную обратную связь и способствуя развитию навыков высшего порядка мышления. Однако критики предупреждают о риске поверхностного вовлечения, когнитивного разгрузки и алгоритмических предвзятостей, которые могут подорвать процесс глубокого обучения. В данной статье рассматривается вопрос о том, может ли генеративный ИИ действительно способствовать развитию когнитивных навыков в обучении английскому языку как иностранному (EFL). Основываясь на социокультурной теории Л.С. Выготского и таксономии Блума, исследуется, каким образом такие стратегии, как ИИ-опосредованный сократический диалог, ведение рефлексивных учебных журналов и задания по трансформации жанров, могут развивать аналитическое мышление, метакогнитивную осознанность и перенос

навыков. Вместе с тем выявлены риски, включая «иллюзорное содействие» и цифровое неравенство, что подчеркивает необходимость тщательной педагогической интеграции. Встраивая ИИ в практики рефлексии, критического осмысления и совместного обучения в группах, педагоги могут превратить его из пассивного инструмента в активного партнера, способствующего формированию автономных, критически мыслящих и социально ответственных обучающихся.

INTRODUCTION

The relationship between education and technology has long swung between optimism and doubt. Each innovation—from filmstrips and language labs to MOOCs—has sparked visions of transformation, only to reveal a sobering truth: tools alone do not provoke deeper thinking. It is their integration into meaningful pedagogy that determines their value. Today, generative AI stands at the center of this debate. With its capacity for real-time feedback and personalized scaffolding, it is heralded as both a powerful ally and a potential mirage. The central question is this: Can generative AI truly cultivate the cognitive skills essential for deep learning, or does it merely simulate intelligence without substance?

For decades, educators have wrestled with the question of whether technology can foster intellectual and cognitive growth. From the tape recorders of the 1960s to the intelligent tutoring systems of the 1990s, innovations have consistently promised to revolutionize education but often failed to impact the deeper processes of thought. Now, generative AI—particularly LLMs like GPT—has emerged as the latest technology to inspire both enthusiasm and skepticism. Advocates argue these systems provide individualized scaffolding, simulate intelligent dialogue, and empower learners to tackle complex ideas in unprecedented ways. Yet concerns remain: does generative AI truly support cognitive development, or does it offer only the illusion of understanding, concealing rather than addressing conceptual gaps?

At the heart of this inquiry lies an essential question: what do we mean by “cognitive skills” in language education? These skills go beyond memorizing grammar rules or vocabulary; they involve higher-order thinking such as analysis, synthesis, evaluation, and metacognition—the ability to monitor and regulate one’s thought processes. Drawing on Vygotsky’s sociocultural theory and Bloom’s taxonomy, this paper examines whether generative AI can effectively nurture such complex learning outcomes. It considers both the theoretical potential and practical challenges of employing AI as a cognitive partner in English language teaching and learning.

THEORETICAL FOUNDATIONS

Cognitive skills in language learning refer to learners’ capacity to think critically and reflectively about how language works. These include analytical reasoning (identifying patterns and evaluating linguistic choices), metacognition (awareness and control over one’s thinking), and transfer (applying learned skills across different contexts). Such abilities are vital for moving beyond rote memorization toward deeper linguistic competence.

Vygotsky’s concept of the Zone of Proximal Development underscores the role of scaffolding in helping learners advance from their current level of understanding to

greater mastery. Similarly, Bloom's taxonomy emphasizes engaging learners in higher-order thinking tasks like analysis, evaluation, and creation. Together, these frameworks provide a lens for assessing whether AI supports or undermines cognitive development.

Large language models like GPT-4 are trained on massive datasets and use probabilistic algorithms to predict and generate text. While their outputs often appear coherent and contextually appropriate, these systems do not "understand" language in the human sense. This raises the risk that students may accept AI-generated suggestions uncritically, mistaking them for authoritative insights. The challenge, then, lies in positioning AI as a tool for reflection and dialogue—not as a substitute for human thinking.

DISCUSSION

Emerging empirical research provides a nuanced understanding of how generative AI can shape cognitive skill development in English language education, particularly for learners of English as a foreign language (EFL). One notable study explored the use of AI-mediated Socratic dialogue, where advanced EFL learners engaged with an AI that posed probing, open-ended questions such as, "Why might this word choice alter the tone?" Over eight weeks, students exposed to this method demonstrated a measurable improvement in their ability to justify linguistic decisions and to generate alternative phrasings. This suggests that AI-facilitated inquiry can stimulate analytical reasoning and encourage learners to approach language use more critically.

Reflective practices, such as learning logs, have also been leveraged to promote metacognition in AI-assisted classrooms. In one intervention, students systematically recorded their responses to AI-generated feedback, explicitly noting whether they accepted, rejected, or modified suggestions and explaining their reasoning. When these reflective logs were coupled with structured peer discussions, learners exhibited heightened awareness of their cognitive processes and adopted more deliberate, strategic approaches to revising their work. Compared to a control group, these students displayed stronger metacognitive habits, which are key to developing self-regulated learning skills.

Genre transformation tasks further illustrate AI's potential in fostering cognitive transfer. For instance, students were tasked with reworking AI-generated academic abstracts into journalistic articles. When the AI offered annotated explanations highlighting stylistic and rhetorical differences between genres, learners not only applied conventions more effectively but also articulated their rationale for specific revisions. This points to the value of embedding explicit reasoning into AI-supported activities to promote higher-order thinking and the ability to transfer skills across contexts.

Yet, these promising outcomes are tempered by significant challenges. One critical concern is the phenomenon of "illusory facilitation," wherein generative AI produces text that appears polished and convincing on the surface but lacks conceptual depth. Students may accept such outputs at face value, missing vital opportunities for deeper engagement and critical analysis. Cognitive offloading presents another risk: overreliance on AI can lead learners to bypass the mental effort required for critical reasoning, potentially stunting the development of durable cognitive pathways. Moreover, issues of equitable access cannot be overlooked. Learners with limited digital literacy or restricted access to advanced technologies may struggle to engage effectively with AI tools, exacerbating existing educational disparities. Finally, biases embedded within AI training data risk

reinforcing narrow perspectives and perpetuating stereotypes, raising ethical questions about the uncritical adoption of such technologies in diverse learning environments.

Taken together, these findings underscore the dual nature of generative AI in language education: it holds immense potential as a cognitive scaffold but also carries inherent risks that demand thoughtful, pedagogically informed integration.

PEDAGOGICAL RECOMMENDATIONS

To harness the potential of generative AI as a catalyst for cognitive growth—rather than as a superficial shortcut—educators must adopt reflective and scaffolded approaches that embed AI meaningfully into language learning. The goal should not be to position AI as an all-knowing authority but to frame it as a provisional partner in inquiry and dialogue.

First, teachers should design tasks and prompts that compel students to critically engage with AI suggestions. For instance, rather than asking students to simply accept or reject AI feedback, instructors can require learners to justify their choices in writing or orally, articulating why they agree, disagree, or propose an alternative. This kind of reflective justification fosters metacognitive awareness and strengthens learners' ability to evaluate language critically.

Second, modeling metacognitive strategies is essential. Educators can use "think-aloud" protocols when interacting with AI-generated outputs, demonstrating how to interrogate revisions, question underlying assumptions, and evaluate the appropriateness of linguistic choices. By making their reasoning processes visible, teachers help students internalize analytical habits they can apply independently.

Third, integrating peer collaboration into AI-supported activities can enhance critical engagement. Structured group discussions in which students collaboratively assess AI feedback, debate alternative solutions, and identify patterns across their texts can deepen reflective thinking and promote a culture of shared inquiry. Such dialogues also help mitigate overreliance on AI by situating its suggestions within a broader social and cognitive context. Transfer tasks should also play a central role in curriculum design. Activities that require learners to adapt AI-generated content for different genres, audiences, or purposes—such as converting an academic essay into a blog post or a speech—encourage cognitive flexibility and higher-order thinking. When paired with explicit instruction on genre conventions and audience awareness, these tasks can equip students with tools to critically navigate and reshape AI output.

Moreover, educators must address the risks highlighted in recent studies. To counteract cognitive offloading, instructors can set limits on AI use during certain stages of the writing process, ensuring that learners engage in unaided brainstorming, drafting, or revising before consulting AI tools. Workshops on digital literacy and critical AI awareness are also vital, especially for students from underserved backgrounds, to ensure equitable access and informed use of technology.

Finally, it is imperative to acknowledge and address the potential biases inherent in AI systems. Educators should foster critical conversations about how AI tools are trained, whose voices are represented (or excluded) in datasets, and how algorithmic outputs can reflect societal stereotypes. Such critical AI literacy equips students not only to use generative tools effectively but also to question their limitations and ethical implications.

CONCLUSION

"*The purpose of AI is not to replace humans, but to amplify human abilities.*" This insight from Fei-Fei Li encapsulates the transformative potential of generative AI in English language education. Used thoughtfully, AI can scaffold analytical reasoning, promote metacognition, and foster the transfer of skills across diverse communicative contexts. It can act as a partner in inquiry, helping learners engage more deeply with language and develop as autonomous, critical thinkers. Yet, realizing this potential requires careful pedagogical design. Without explicit scaffolding, students risk cognitive offloading, superficial engagement, and uncritical acceptance of AI outputs. Furthermore, disparities in access and digital literacy demand that educators approach AI integration with equity and inclusivity at the forefront. Ultimately, the challenge lies in leveraging AI's strengths while mitigating its limitations. By embedding it within reflective, collaborative, and ethically informed teaching practices, educators can ensure that AI serves not as a crutch, but as a springboard for cultivating critical, adaptable, and socially responsible language learners.

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