INFORMATION PLATFORM "CENTER FOR INNOVATIVE THINKING"
UKRAINIAN INSTITUTE OF SCIENTIFIC STRATEGIES
EUROPEAN UNION RESEARCH DEPARTMENT
SCIENTIFIC AND PUBLISHING CENTER "PROGRESS"

SCIENCE, TECHNOLOGY AND CULTURE: STRATEGIES FOR SUSTAINABLE DEVELOPMENT

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PEDAGOGY AND EDUCATION

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GENERATIVE AI IN LINGUODIDACTICS: TRANSFORMING FOREIGN LANGUAGE LEARNING THROUGH LARGE LANGUAGE MODELS

Abstract. This article explores the transformative impact of Generative AI and Large Language Models on Language Teaching. It identifies a paradigm shift from Computer-Assisted Language Learning to AI-based Language Learning, driven by AI's ability to generate authentic content. It considers the architectural basis of Large Language Models (Transformer), opportunities for deep personalization, and a radical breakthrough in the development of productive competencies (speaking, writing).

Keywords: Generative AI, LLM, AILL, CALL, language teaching.

The process of technological support for foreign language (FL) learning has undergone significant evolution, beginning with the Computer-Assisted Language Learning (CALL) approach. Early CALL systems were based on fixed algorithms that created an artificial learning environment, as they could not generate authentic and spontaneous content.

A fundamental methodological shift occurred with the emergence of AI-based Language Learning (AILL). AILL is driven by technological capacity for language content generation rather than merely its discrimination or assessment. Within this new paradigm, technology transforms into a cognitive partner capable of meaningful dialogue, adaptation, and the creation of authentic communicative scenarios.

The following stages are traditionally distinguished in the periodization of AILL development:

1. Initial stage: Electronic language learning (until the 1980s). The basis is Computer-Assisted Instruction (CAI) – the use of a computer as a simulator for automating exercises, reinforcing grammatical structures, and vocabulary. The communicative aspect was minimal.

2. Classic CALL (1980s–1990s). Transition from training programs to communicative CALL. Use of multimedia, interactive dialogues, and hypertexts (Hot Potatoes, Tell Me More, Rosetta Stone).

3. Intelligent CALL (ICALL, 1990–2010). Integration of first-generation artificial intelligence elements (expert systems, NLP). Adaptive exercises, error analysis, and writing assessment systems (AutoTutor, ALEKS) appear.

4. Mobile and network learning (2010–2020). The spread of mobile applications and social networks (Duolingo, Memrise).

5. AI-based Language Learning (AILL, 2020–present). Use of generative AI (LLM, ChatGPT, Claude). Models capable of conducting dialogue, creating adaptive scenarios, and acting as cognitive partners (ChatGPT, ELSA Speak, GrammarlyGO).

From a pedagogical point of view, the use of LLMs offers a lot of advantages. First, they personalize the learning process by automatically adapting tasks to the student's level and learning style. Second, LLMs provide instant feedback, which helps correct speech behavior in real time. Third, the generative nature of the models allows for the creation of a large amount of authentic learning content, which significantly expands learning resources. Interactivity and the ability to simulate communication scenarios ensure the development of all language skills - speaking, writing, listening, and reading.

Large Language Models (LLMs) are deep neural networks trained on vast corpora of textual data. They function as statistical prediction engines capable of generating language with rich contextual awareness and elements of reasoning.

A critical catalyst in the development of LLMs is the Transformer architecture. Through the self-attention mechanism, this architecture has enabled efficient parallelization of training on unprecedented data scales. It has also allowed LLMs to process longer contextual sequences, which is essential for maintaining coherence in extended dialogues. To ensure that LLM outputs meet ethical and pedagogical expectations and maintain accuracy, Reinforcement Learning from Human Feedback (RLHF) is employed, optimizing model behavior through human-in-the-loop evaluation.

The integration of LLMs has enabled deep personalization and the creation of authentic communicative scenarios, addressing key limitations of earlier CALL systems. Trained on billions of words, LLMs are capable of generating context-aware interactions that simulate spontaneity, thereby bringing online language practice closer than ever to real-world linguistic immersion. LLMs can automatically adapt tasks, explanations, and communicative scenarios to a learner's current level of proficiency.

Moreover, the integration of LLMs has led to a transformative breakthrough in the development of productive language competencies, namely speaking and writing. This breakthrough lies in the shift from discriminative systems, which merely evaluated correctness, to generative systems capable of producing adaptive and authentic communicative scenarios in real time.

LLMs have opened new horizons for speaking practice, which has traditionally required the continuous presence of a human tutor. Specialized applications (e.g., *Speak*) leverage advanced AI technologies by functioning as round-the-clock conversational partners, enabling users to practice on any topic while simulating the spontaneity of natural communication.

AI tutors provide immediate and detailed feedback through speech analysis. This feedback encompasses the assessment of pronunciation and intonation (including

prosody and accent), grammatical accuracy, and fluency. Some tools also offer explicit explanations as to why particular expressions may sound awkward or unnatural. Furthermore, the system is capable of designing an individualized learning pathway by identifying users' needs and goals at a remarkably deep level. Frequent speaking practice is widely regarded as a key prerequisite for achieving oral fluency.

In the domain of writing, LLM-based assistants (e.g., *Paperpal* or *GrammarlyGO*) have moved far beyond basic spell-checking, employing natural language processing (NLP) and machine learning to conduct comprehensive text analysis and to identify issues related to structure, tone, and clarity.

Their generative capabilities provide advanced support that is particularly valuable for non-native English-speaking (NNES) researchers. LLMs can deliver immediate formative feedback by suggesting strategies to enhance coherence, lexical diversity, and adherence to a formal academic register. Generative functions further enable improved word choice, increased fluency through paraphrasing, and the provision of accurate academic translation.

Despite its advantages, the integration of generative AI entails significant risks that must be addressed within educational contexts.

First, there is a risk of overreliance on technology. Scholars caution that unguided use of LLMs to obtain ready-made answers may undermine long-term knowledge acquisition. In addition, LLMs are prone to generating inaccurate information, commonly referred to as "hallucinations." As these models are unable to independently verify the factual accuracy of their outputs, effective educational use of AI requires mandatory critical evaluation of generated content by learners.

Second, one of the most acute socio-ethical challenges is systemic bias against non-native English speakers (NNES). Empirical studies have shown that more than half of academic writing samples produced by NNES were falsely classified as AI-generated by GPT detection tools, whereas detection accuracy for native speakers was nearly perfect. This issue arises because NNES writing, in striving for formal correctness, often exhibits lower textual perplexity (i.e., greater predictability for language models), which is erroneously interpreted as machine-generated. Such

misclassification poses a direct threat to principles of fairness in education and academic publishing.

To realize the full potential of AILL while mitigating its risks, pedagogically grounded implementation is required-one that integrates AI-driven technological support with meaningful human involvement. This necessitates the adoption of a hybrid learning model that combines AI assistance with mandatory pedagogical guidance from instructors and critical evaluation of AI-generated outputs by learners.

LLMs should be employed through structured prompting and under instructor guidance in order to prevent superficial learning. AI is most appropriately used for generating routine tasks (e.g., exercise creation and initial feedback), while instructors should focus on fostering students' critical thinking, cultural awareness, and ethical use of these tools.

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