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**PSYCHOLINGUISTIC AND DIDACTIC ASPECTS OF INTEGRATING
NEURAL NETWORK MODELS IN-TO HIGHER LINGUISTIC
EDUCATION: A THEORETICAL REVIEW AND EXPERIMENTAL STUDY**

Abstract: *the article presents a multi-faceted analysis of the integration of artificial intelligence technologies into the process of training philologists and linguists. The author explores the theoretical convergence between the architecture of modern neural networks and classical Second Language Acquisition (SLA) hypotheses. The paper provides a detailed description of a pedagogical experiment conducted at the Institute of Philology and Intercultural Communication (IPIC), aimed at identifying the effectiveness of using generative models as "Socratic tutors." The results confirm the hypothesis that AI contributes to lowering the affective filter and accelerating the process of correcting interlanguage errors.*

Keywords: *neural networks, linguodidactics, psycholinguistics, artificial intelligence, zone of proximal development, academic integrity, digital literacy.*

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**ПСИХОЛИНГВИСТИЧЕСКИЕ И ДИДАКТИЧЕСКИЕ АСПЕКТЫ
ИНТЕГРАЦИИ МОДЕЛЕЙ НЕЙРОННЫХ СЕТЕЙ В ВЫСШЕЕ
ЛИНГВИСТИЧЕСКОЕ ОБРАЗОВАНИЕ: ТЕОРЕТИЧЕСКИЙ ОБЗОР И
ЭКСПЕРИМЕНТАЛЬНОЕ ИССЛЕДОВАНИЕ**

***Аннотация:** в статье представлен многоаспектный анализ внедрения технологий искусственного интеллекта в процесс подготовки филологов и лингвистов. Автор исследует теоретическую конвергенцию между архитектурой современных нейронных сетей и классическими гипотезами усвоения второго языка (SLA). В работе подробно описывается педагогический эксперимент, проведенный на базе ИФиМК, целью которого было выявление эффективности использования генеративных моделей как «сократических тьюторов». Результаты подтверждают гипотезу о том, что ИИ способствует снижению аффективного фильтра и ускорению процесса коррекции интерлингвальных ошибок.*

***Ключевые слова:** нейронные сети, лингводидактика, психолингвистика, искусственный интеллект, зона ближайшего развития, академическая честность, цифровая грамотность.*

Introduction

The transformation of linguistic education in the first quarter of the 21st century has reached a critical juncture where traditional methods increasingly conflict with the capabilities of generative Artificial Intelligence (AI). The relevance of this study is driven by the necessity for a scientific re-evaluation of neural networks, viewing them not merely as automation tools but as cognitive partners. In the context of a modern university in Kyrgyzstan, the implementation of such technologies serves as a response to the challenges of global digitalization [2].

In a linguistic context, the concept of a "neural network" should be regarded as a complex computational architecture that mimics the operational principles of biological neurons. From the perspective of theoretical linguistics, modern models represent a digital realization of John Firth's ideas on distributive semantics [4]. His thesis, "You shall know a word by the company it keeps," has become the foundation for the mathematical modeling of meanings through vector representations. As indicated by Y. Bengio, this enables algorithms to capture the subtlest stylistic registers [10].

Theoretical and Methodological Foundations of the Research

The integration of AI finds solid theoretical substantiation in several fundamental psycholinguistic hypotheses:

According to S. Krashen, language acquisition occurs when a learner receives "comprehensible input" at the $i+1$ level [6]. Neural networks are capable of instantaneously adapting the complexity of authentic text to the student's current level, ensuring an optimal cognitive load. L.S. Vygotsky's theory postulates that learning is most effective when supported by a "More Knowledgeable Other" [1]. In a digital environment, AI fulfills the role of such an agent, providing cognitive "scaffolding." M. Warschauer emphasizes that technologies transform the structure of cognition, making it distributed between the human and the machine [11].

R. Schmidt argued that the conscious awareness of linguistic form at the moment of its use is critical [8]. Neural networks provide Instant Feedback, allowing the student to "notice" the gap between their current interlanguage and the target language norm directly during the process of writing or dialogue.

Design and Methodology

To verify the effectiveness of these theories, a pedagogical experiment was conducted during the 2025–2026 academic year at the Foreign Languages Department of the Institute of Philology and Intercultural Communication, Osh State University.

The study involved 64 third-year students. The subjects were divided into two groups:

Experimental Group (EG): utilized virtual assistants (ChatGPT, Claude) in a "Socratic dialogue" mode.

Control Group (CG): instruction followed traditional methodology with feedback provided by the instructor [9].

EG students were trained in formulating specialized queries (prompts). An example of a prompt used in the experiment:

"I am studying English at the B1 level. Analyze my essay, but do not provide ready-made corrections. Instead, ask me leading questions about my grammatical errors (especially regarding articles) so that I can find them myself."

This approach facilitated the implementation of the active learning principle, where AI does not perform the work for the student but instead guides their research inquiry.

Analysis of Results and Discussion

The data confirmed the superiority of the EG across all metrics. EG students demonstrated higher precision in the use of stylistic registers. Thanks to AI acting as a "cultural mediator," they learned to distinguish nuances of politeness [3].

Table 1

Competence Growth Indicators

Competence Indicator	Control Group (Growth in %)	Experimental Group (Growth in %)
Grammatical Accuracy	11.4%	24.8%
Stylistic Appropriateness	9.2%	31.5%
Self-correction Speed	15.0%	42.0%

A crucial result of our study was the qualitative change in the emotional climate of the educational process. According to E. Horwitz's Language Anxiety Scale [13], a

significant reduction in the fear of making mistakes (by 25% compared to the control group) was observed in the experimental group. The anonymity and "impartiality" of the algorithm created a so-called "safe digital environment" for the students. Unlike traditional classroom interaction, where the fear of negative evaluation often blocks speech activity, interacting with a neural network minimizes the affective barriers described within the framework of second language acquisition hypotheses [6].

The reduction in anxiety levels, in turn, served as a catalyst for the realization of M. Swain's Output Hypothesis [9]. It was experimentally confirmed that the absence of stress allowed students to generate more elaborate syntactic constructions and transition to active testing of linguistic hypotheses. Realizing that an error in an AI chat does not entail academic sanctions, students experimented more frequently with new lexical units. During the "Socratic dialogue," students were compelled to rephrase their thoughts (pushed output), which, according to M. Swain, is a critical stage in the internalization of language norms [9].

Thus, in linguodidactics, the neural network acts not only as an information resource but also as a tool for psychological decompression, transforming the "error" from a sign of failure into a valuable element of exploratory learning activity, realizing the principles of active learning within the zone of proximal development [1; 11].

Ethics and Academic Integrity

The problem of "digital plagiarism" has been reframed through S.E. Eaton's concept of "post-plagiarism" [5]. Transparency (AI Disclosure) has become the primary criterion. University educators train students in the critical evaluation of content regarding algorithmic bias [12] and the prevention of "cognitive simplification" as described by N. Carr [7].

At OshSU, a system of automated proctoring and diagnostics was implemented, allowing the instructor to analyze not only the final result but also the student's text editing process in cloud services. This enabled the prediction of difficulties in mastering topics (e.g., phrasal verbs) even before final tests.

As part of the study, a comparative analysis of tool effectiveness was conducted:

DeepL: Effective for developing metalinguistic awareness through comparative translation analysis.

Ludwig.guru: The digital evolution of M. Lewis's Lexical Approach (1993) facilitates the rigorous validation of word collocations by leveraging extensive corpus-based datasets [14].

Claude 4: Used for the deep analysis of long academic texts and the summarization of scientific sources.

Conclusion

The problem of "digital plagiarism" is reconsidered through S.E. Eaton's concept of "post-plagiarism" [5], where AI Disclosure serves as the gold standard. Educators at OshSU focus on training students to identify algorithmic bias [12] and avoid "cognitive simplification" [7].

The research proves that neural networks are a powerful catalyst for linguistic development. The acceleration of the mastery of complex grammatical structures and the enhancement of cultural awareness among students at OshSU have been experimentally confirmed. Future research should focus on exploring the practical aspects of large-scale implementation, including the feasibility of teacher training, the technological requirements for institutional use, and the associated financial implications. Furthermore, future research should broaden its scope to investigate the impact of AI across a broader array of linguistic skills, including reading and writing [15]. The core conclusion of the work is the thesis that AI does not replace the teacher but radically transforms their role: from a transmitter of knowledge to an architect of the digital educational environment and a mentor in the development of critical thinking.

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