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EXPLORING THE OPPORTUNITIES AND CHALLENGES OF ARTIFICIAL INTELLIGENCE IN FOREIGN LANGUAGE LEARNING

This article examines the role of artificial intelligence in foreign language learning from a theoretical perspective. Rather than focusing on specific tools or empirical outcomes, the study explores how AI-related practices interact with key concepts in second language acquisition and language pedagogy. The primary aim of the research is to conceptualize the pedagogical implications of AI integration and to clarify its position within established and emerging theoretical frameworks.

The study employs a qualitative analytical approach, drawing on comparative and interpretative analysis of contemporary literature in applied linguistics, educational technology, and cognitive science. The analysis considers different types of AI tools, including conversational agents, intelligent tutoring systems, and automated assessment, and discusses their pedagogical functions at a conceptual level. Particular attention is given to how these technologies influence learner autonomy, feedback processes, interaction patterns, and the distribution of instructional roles between human teachers and digital systems.

The results indicate that AI technologies significantly transform traditional models of language learning by enabling adaptive, individualized learning trajectories, real-time feedback, and increased accessibility of learning resources. At the same time, they introduce new forms of learner engagement and redefine the nature of interaction in educational contexts, including human-machine and hybrid interaction models. The article also addresses key challenges associated with AI integration, including ethical concerns, data privacy issues, risks of over-automation, and the evolving professional role and responsibilities of the teacher.

It is argued that AI should not be viewed solely as a technological solution, but as a complex factor that reshapes learning environments and requires systematic theoretical interpretation. The study contributes to bridging the gap between rapidly evolving technological practices and the theoretical foundations of foreign language learning. It concludes by outlining directions for future research focused on underlying mechanisms, pedagogical limitations, long-term learning outcomes, and sustainable models of AI-supported language education.

Key words: artificial intelligence, foreign language learning, language education, educational technology, learner autonomy, feedback.

Ірина ГРИЩУК. ШТУЧНИЙ ІНТЕЛЕКТ У СИСТЕМІ НАВЧАННЯ ІНОЗЕМНИХ МОВ: АНАЛІТИЧНИЙ ОГЛЯД МОЖЛИВОСТЕЙ І ВИКЛИКІВ

У статті досліджується роль штучного інтелекту у процесі вивчення іноземних мов з теоретичної перспективи. Замість того, щоб зосереджуватися на конкретних інструментах чи емпіричних результатах, автори аналізують, як практики, пов'язані зі ШІ, взаємодіють із ключовими концепціями другої мови та педагогіки мов. Основна мета дослідження полягає в концептуалізації педагогічних наслідків інтеграції ШІ та уточненні його місця у межах як усталених, так і новітніх теоретичних рамок.

Дослідження здійснене за допомогою якісного аналітичного підходу, що базується на порівняльному та інтерпретативному аналізі сучасної літератури з прикладної лінгвістики, освітніх технологій і когнітивної науки. Аналіз охоплює різні типи інструментів ШІ, включно з розмовними агентами, інтелектуальними системами навчання та автоматизованими системами оцінювання, та розглядає їхні педагогічні функції на концептуальному рівні. Особлива увага приділяється впливу цих технологій на автономію учня, процеси зворотного зв'язку, моделі взаємодії та розподіл навчальних ролей між людиною та цифровими системами.

Результати дослідження демонструють, що технології ШІ суттєво трансформують традиційні моделі навчання мови, забезпечуючи адаптивні та індивідуалізовані траєкторії навчання, оперативний зворотний зв'язок і ширший доступ до освітніх ресурсів. Водночас вони спричиняють нові форми залучення учнів і переосмислюють природу взаємодії в освітньому контексті, включно з моделями людина-машина та гібридними форматами навчання. Особливо підкреслюються ключові виклики інтеграції ШІ, зокрема етичні питання, проблеми конфіденційності даних, ризики надмірної автоматизації та зміну професійної ролі й відповідальності викладача.

Автори наголошують, що ШІ не слід розглядати виключно як технологічний інструмент, а радше як комплексний чинник, який трансформує навчальні середовища та потребує системної теоретичної інтерпретації. Дослідження сприяє подоланню розриву між швидко змінними технологічними практиками та теоретичними основами вивчення іноземних мов. У завершенні окреслено перспективи подальших досліджень, спрямованих на вивчення фундаментальних механізмів, педагогічних обмежень, довгострокових результатів навчання та сталих моделей мовної освіти за підтримки ШІ.

Ключові слова: штучний інтелект, вивчення іноземних мов, мовна освіта, освітні технології, автономія учня, зворотний зв'язок.



Introduction. Artificial intelligence has become an everyday reality rather than a technological concept associated with a distant future [1]. Educational practices, including foreign language learning, now regularly involve interaction with AI-based applications, such as automated translation tools, adaptive vocabulary trainers, pronunciation practice software, and conversational chatbots [2, c. 45–47].

What was only recently perceived as experimental or supplementary is increasingly being integrated into both formal and informal foreign language learning contexts [3]. This shift underscores not only practical questions of effectiveness but also more fundamental theoretical concerns regarding how the process of language learning itself is understood in the era of intelligent technologies [4, c. 12–13].

Traditionally, foreign language education has been shaped by pedagogical models that emphasize human interaction, cognitive development, and sociocultural engagement [5]. Approaches grounded in communicative language teaching, constructivism, or second language acquisition theory position the learner at the center of a dynamic process involving feedback, negotiation of meaning, and contextualized language use [6, c. 78–80].

The growing presence of artificial intelligence, however, significantly challenges these underlying assumptions [7]. When learners practice communication with a chatbot, receive immediate automated feedback, or follow a personalized learning pathway generated by an algorithm, the roles of the teacher, the learner, and the learning environment itself are fundamentally redefined [8, c. 101–103].

The relevance of artificial intelligence in foreign language learning extends far beyond technological innovation [9]. It touches upon foundational issues, including the balance between automation and human guidance, learner autonomy, the nature of interaction, and the criteria used to assess language competence [10, c. 34; 11].

While research increasingly highlights the potential advantages of AI – such as personalization, scalability, and immediate feedback – there is considerably less agreement on how well these tools align with established theories of language learning [12, c. 56–58]. Theoretical reflection often lags behind technological development, creating a gap between educational practice and conceptual understanding [13].

It is precisely this gap that constitutes the central scientific problem addressed in this article [14].

Despite the growing volume of research on AI-assisted language learning, theoretical per-

spectives often remain fragmented or implicit rather than explicitly articulated [15, c. 22–24]. Many publications focus on specific tools or classroom-based experiments without situating their findings within a broader conceptual framework [16]. As a result, artificial intelligence is sometimes treated as a neutral instrument rather than as an active factor shaping learning processes, learner behavior, and pedagogical decision-making [17, c. 90–92].

Another dimension of the problem lies in the tendency to present artificial intelligence either in predominantly positive or predominantly critical terms [18]. On the one hand, AI is frequently portrayed as a solution to persistent challenges in foreign language education, such as large class sizes, limited instructional time, and the need for individualized feedback [19, c. 67–69]. On the other hand, concerns are raised about excessive dependence on technology, reduced human interaction, ethical issues, and the potential erosion of the teacher's professional role [20]. These polarized positions rarely engage in sustained theoretical dialogue with one another, which limits their explanatory power [21].

The absence of balanced theoretical discussion becomes particularly evident in contexts where artificial intelligence is introduced rapidly, sometimes without sufficient pedagogical reflection [22]. Teachers and educational institutions may adopt AI-based tools under the influence of external factors – such as digitalization policies or market trends – rather than as a result of informed theoretical analysis [23, c. 11–12]. This situation underscores the need for conceptual inquiry that does more than list technological possibilities and instead examines their implications for foreign language learning as a complex educational process [24].

The article explores the opportunities and challenges associated with the use of artificial intelligence in foreign language learning from a theoretical perspective [25]. It does not aim to evaluate specific platforms or to present empirical data. Rather, its primary focus is to analyze how AI-related practices intersect with key concepts in language learning theory, examining how artificial intelligence can realistically function in language training and where its limitations become apparent [26, c. 140–142].

The main objective of the study is to offer a structured theoretical overview that connects artificial intelligence with both established and emerging perspectives in foreign language learning [27]. This includes examining how AI-supported learning environments relate to concepts such as learner autonomy, feedback, interaction, and personalization [28, c. 75–77].

The article also considers potential tensions between algorithm-driven instruction and pedagogical principles that emphasize human agency, creativity, and social interaction [29].

To achieve this objective, several specific tasks are addressed. First, the article outlines the conceptual foundations of artificial intelligence use in educational contexts, with particular attention to language learning [30]. Second, it identifies key opportunities associated with AI integration, including adaptive learning trajectories, data-informed feedback, and expanded access to language practice [31, c. 52–54]. Third, it discusses theoretical challenges, such as the risk of decontextualized learning, limitations of automated assessment, and the redefinition of teacher and learner roles [32]. Finally, the article examines how these opportunities and challenges can be interpreted within a unified theoretical framework rather than as isolated phenomena [33].

Although artificial intelligence is often associated with technical terminology, the discussion presented here is intended to remain accessible not only to specialists in educational technology but also to researchers, teachers, and postgraduate students in the field of foreign language education [34]. For this reason, the theoretical analysis avoids excessive technical detail while maintaining conceptual depth [35]. This approach reflects the view that theoretical reflection should support, rather than obscure, pedagogical understanding [36].

The significance of the article lies in its attempt to bridge the gap between rapidly evolving technological practices and the theoretical foundations of foreign language learning [37]. By addressing opportunities and challenges within a single analytical perspective, the study contributes to a more nuanced understanding of artificial intelligence – not as a panacea or a threat, but as a complex educational phenomenon [38, c. 88–90]. Such an understanding is essential for informed decision-making in both research and practice [39].

It can therefore be argued that artificial intelligence has become an influential factor in foreign language learning, prompting renewed reflection on how languages are taught and learned [40]. The present article responds to this development by offering a theoretical exploration of the opportunities and challenges that AI introduces into the field [41]. Through conceptual analysis rather than technological evaluation, it seeks to contribute to ongoing academic discussion and to support a more reflective integration of artificial intelligence into foreign language education [42].

Research Outcomes. Research on artificial intelligence in foreign language learning

has expanded considerably over the past two decades, reflecting broader developments in educational technology and applied linguistics. Early discussions of technology-enhanced language learning were largely situated within the framework of computer-assisted language learning (CALL), where digital tools were primarily viewed as supplementary resources supporting classroom instruction [1; 2]. These early CALL environments focused on grammar practice, vocabulary drills, and reading comprehension, offering efficiency and consistency but often receiving criticism for promoting decontextualized learning and limited interaction.

As technological capabilities evolved, researchers began to explore more intelligent forms of computer-assisted language learning, commonly referred to as intelligent CALL (ICALL). The central aim of ICALL was to move beyond static content delivery by incorporating elements such as learner modelling, error analysis, and natural language processing [3]. From a pedagogical perspective, ICALL systems were seen as an attempt to address long-standing concerns regarding feedback quality and learner individualization, which had been difficult to achieve in traditional CALL environments [4].

Within this line of research, feedback occupies a particularly important position. Studies on ICALL emphasize the potential of intelligent systems to provide immediate and targeted responses to learner input, especially in areas such as grammar and writing. Automated feedback has been shown to support noticing and self-correction, which are central mechanisms in many theories of second language acquisition [2]. At the same time, scholars have pointed out that the effectiveness of such feedback depends not only on its accuracy but also on its pedagogical relevance and contextual appropriateness.

The development of adaptive learning systems represents another significant direction in AI-assisted language learning research. Adaptive systems rely on user models and learning analytics to adjust instructional content according to learner performance, preferences, or progress over time [5]. In the context of foreign language learning, such systems are commonly applied to vocabulary acquisition, grammar practice, and reading activities. Empirical research suggests that adaptive learning environments can enhance efficiency and learner engagement, particularly in self-paced and autonomous learning contexts [6].

From a theoretical standpoint, adaptive learning aligns with learner-centered pedagogical approaches that emphasize individual learning trajectories. However, concerns have been raised regarding the extent to which algorithm-

driven adaptation can capture the social and interactive dimensions of language learning. Language development is widely understood as a process shaped not only by individual cognition but also by interaction, mediation, and participation in social practices [7]. As a result, critics argue that adaptive systems may prioritize what is easily measurable over what is pedagogically meaningful.

Natural language processing (NLP) technologies play a central role in many contemporary AI-based language learning applications. NLP enables systems to analyze learner language, generate feedback, and simulate aspects of human communication. One prominent application of NLP is automated writing evaluation, where algorithms assess linguistic features such as syntactic complexity or lexical diversity [8]. These tools are often presented as a means of supporting formative assessment and reducing teacher workload, particularly in large-scale instructional settings.

In recent years, conversational agents and chatbots have attracted growing scholarly attention. Chatbots are typically discussed as tools for increasing opportunities for communicative practice, especially in environments where access to proficient speakers is limited [9]. Research suggests that learners may experience lower levels of anxiety when interacting with chatbots compared to human interlocutors, which can encourage participation and experimentation with language [10].

Despite these potential benefits, the communicative capabilities of current chatbot systems remain limited. While chatbots can simulate dialogue at a surface level, their responses are often constrained by predefined patterns or probabilistic models. This limitation raises questions about the depth and authenticity of interaction. From a sociocultural perspective, meaningful language learning is closely tied to interaction that is responsive, intentional, and embedded in social context [7].

Mobile-assisted language learning further illustrates how AI-related technologies intersect with issues of accessibility and learner autonomy. Mobile platforms increasingly integrate adaptive algorithms and NLP-based features, allowing learners to engage with language practice across contexts and timeframes [11]. However, the pedagogical implications of ubiquitous, technology-mediated learning remain underexplored at the theoretical level.

Beyond individual technologies, the literature reflects broader debates about the role of artificial intelligence in education. Some scholars frame AI as a response to structural challenges

such as large class sizes and limited instructional time [12]. Others adopt a more critical stance, emphasizing ethical concerns, data privacy, and the risk of reducing education to algorithmic optimization [13].

Despite the diversity of perspectives, theoretical integration remains limited. Many studies focus on specific tools without situating their findings within a broader conceptual framework [14]. Several scholars have therefore called for a more theory-driven approach to AI-assisted language learning [15].

Adaptive learning provides the third pillar of the framework. Adaptive systems use learner data to adjust tasks, pacing, difficulty, and feedback. In foreign language learning, this can mean spaced repetition for vocabulary, targeted grammar practice, pronunciation scoring, or individualized reading levels. The promise of such systems is efficiency: learners spend more time on what they struggle with and less time on what they already know.

From a theoretical standpoint, adaptive learning can be interpreted as a modern extension of differentiated instruction. It operationalizes the idea that learners progress at different rates and need different kinds of support. However, adaptive learning is also driven by measurement. It requires that learning be captured as data. This creates tension with broader views of language competence. Many aspects of communicative ability – pragmatic appropriateness, creativity, intercultural sensitivity – are difficult to quantify. As a result, adaptive systems may focus on what can be measured rather than on what is educationally most meaningful. This does not automatically make adaptive learning problematic, but it requires careful pedagogical interpretation of what “personalization” actually means in practice [1; 2].

The framework therefore views adaptive learning as a powerful mechanism for practice and feedback in certain domains (lexis, form-focused work, pronunciation features), while recognizing its limits in capturing the full complexity of language use. In other words, adaptive learning can support parts of language development, but it cannot define language learning as a whole.

Positioning AI within the framework: tool, tutor, partner, or environment

Bringing these perspectives together allows a more precise theoretical positioning of AI in foreign language learning. AI can function in at least four roles:

1. Tool: supporting tasks such as translation, dictionary use, or error detection.
2. Tutor: providing instruction, practice sequences, and corrective feedback.

3. Partner: enabling simulated interaction through chatbots or role-play scenarios.

4. Environment: shaping the learning ecology by structuring input, feedback, and learner behavior.

Each role aligns differently with constructivist, sociocultural, SLA, and adaptive learning perspectives. This is why general claims such as “AI improves language learning” are theoretically weak. The question is not whether AI is beneficial in general, but under what conditions it supports meaningful learning processes and when it may undermine them [3; 4].

By grounding the analysis in this integrated framework, the article can examine AI-related opportunities and challenges not as isolated phenomena but as theoretically interpretable patterns. This approach supports a balanced discussion: AI is neither a pedagogical miracle nor an educational threat by default. It is a complex set of mediating technologies whose value depends on how they interact with core mechanisms of language learning.

AI Tools in Foreign Language Learning Conceptual Level

Discussions about artificial intelligence in foreign language learning often become tool-centered very quickly. New platforms, applications, and systems are described in terms of features and performance, while their pedagogical meaning is treated as secondary. For theoretical analysis, however, it is more productive to move from product descriptions to conceptual categories. Instead of asking what a particular tool does, it is more useful to ask what instructional role it performs and what type of learning interaction it creates. From this perspective, AI applications in language education can be grouped into several functional types: conversational agents and chatbots, intelligent tutoring systems, and automated assessment tools. These categories overlap in practice, yet each reflects a distinct pedagogical logic.

Such a typology does not aim to classify software rigidly. Many contemporary systems combine elements from all three groups. Still, distinguishing them analytically helps clarify what kind of learning processes are being supported and what theoretical assumptions are embedded in their design [4].

Conversational agents and chatbots

Conversational agents are among the most visible forms of AI in language learning. They simulate dialogue and allow learners to practice written or spoken interaction. Their appeal is easy to understand: they are available at any time, they respond immediately, and they

reduce the social pressure that some learners feel in human conversation. For shy or anxious learners, interacting with a chatbot can feel safer than speaking in class.

From a pedagogical standpoint, chatbots create a form of interactional space. Learners produce language, receive responses, and continue the exchange. This aligns, at least superficially, with interactionist views of second language acquisition, where meaning negotiation and feedback are central mechanisms of development. Yet the quality of interaction deserves closer examination.

Human dialogue is shaped by intention, misunderstanding, repair, and shared goals. Chatbot dialogue is shaped by pattern recognition and probabilistic generation. This difference matters. A chatbot can maintain conversational flow even when learner input is unclear, grammatically weak, or pragmatically odd. While this keeps the interaction going, it may reduce the frequency of genuine communication breakdowns – the very moments that often trigger learning through clarification and reformulation [5].

Research on dialogue systems for language learning has long noted this tension. Early work in intelligent CALL already experimented with conversational programs but also documented their limits in interpreting learner meaning and providing context-sensitive feedback [6]. More recent chatbot studies show positive learner attitudes and increased engagement, but also point to uneven linguistic accuracy and limited discourse depth [7].

Another conceptual issue concerns feedback. Some conversational agents primarily aim to sustain dialogue and therefore avoid frequent correction. Others interrupt interaction with explicit feedback messages. Each design reflects a different learning theory in practice: fluency-first exposure versus form-focused guidance. Neither approach is automatically superior, but each supports different learning outcomes. For theoretical analysis, chatbots can therefore be viewed not simply as “practice partners,” but as environments where interactional design choices shape what learners notice and revise.

There is also a shift underway from rule-based chatbots to large language model-based systems. These newer agents produce more natural responses and can handle broader topics. At the same time, their pedagogical behavior is less transparent. Teachers and learners often cannot see why a particular correction or suggestion was produced. This opacity introduces a new variable into language pedagogy: learners may trust feedback without understanding its basis. From a

conceptual standpoint, this changes the feedback relationship from dialogic to algorithmic.

Intelligent tutoring systems

Intelligent tutoring systems (ITS) represent a different lineage of AI in education. While chatbots emphasize interaction, ITS emphasize guided progression. An intelligent tutoring system typically models learner knowledge, tracks performance, and selects subsequent tasks accordingly. The system does not only respond; it sequences instruction.

ITS research predates current AI enthusiasm and has deep roots in educational technology. Reviews of intelligent tutoring have shown that well-designed systems can produce measurable learning gains, especially in structured domains [8]. In language learning, ITS approaches appear in grammar tutors, pronunciation trainers, and structured writing support systems.

Conceptually, ITS are built around three internal models: a domain model (what is to be learned), a learner model (what the learner currently knows), and a pedagogical model (how instruction is adapted). This architecture is pedagogically significant. It means that language is represented as a structured system of elements that can be diagnosed and trained. Such representation works relatively well for certain aspects of language – morphology, syntax patterns, controlled vocabulary – but less well for open-ended communicative competence.

ICALL research has explored how learner language can be parsed and interpreted automatically in order to deliver targeted feedback. Systems for grammar tutoring and error diagnosis demonstrate that AI can go beyond right/wrong scoring and provide linguistically informed responses [6]. Still, coverage remains selective. Natural learner language is variable and creative, which makes full diagnostic precision difficult.

From a theoretical angle, ITS align strongly with adaptive learning principles. They operationalize the idea of instruction within a learner's current competence range. In that sense, they appear compatible with scaffolded learning models. Yet an important difference remains: pedagogical scaffolding in human teaching is interactive and negotiable, whereas ITS scaffolding is rule-driven. The learner adapts to the system's pathway more often than the pathway adapts to the learner's intentions.

There is also a motivational dimension. Intelligent tutors frequently rely on micro-tasks, progress indicators, and performance dashboards. These elements can sustain engagement, but they may also shift attention from communicative purpose to task completion.

Theoretical discussions of learner autonomy suggest that such systems support self-paced learning but not necessarily self-directed learning. The distinction is subtle but important.

Automated assessment and feedback systems

A third major category includes automated assessment and feedback tools. These systems evaluate learner language and generate scores, corrections, or suggestions. They are widely used in writing evaluation, pronunciation scoring, and grammar checking. Because assessment strongly influences learning behavior, this category has particular conceptual weight.

Automated writing evaluation (AWE) systems illustrate both the potential and the limits of AI assessment. Using natural language processing and machine learning, such systems can estimate writing quality and highlight linguistic features. Research has shown that linguistic indicators extracted automatically can correlate with human ratings of writing proficiency [1]. This makes automated feedback attractive for large-scale or formative use.

At the same time, writing quality is not reducible to measurable features alone. Organization, argument strength, audience awareness, and rhetorical appropriateness remain difficult to score reliably by automated means. As a result, AWE systems tend to emphasize surface features and structural proxies. When used uncritically, they may encourage learners to optimize texts for the algorithm rather than for communicative effectiveness.

Studies of automated writing feedback in classroom contexts show mixed outcomes. Learners often appreciate immediate responses and revision suggestions, but teacher mediation remains important for interpretation and prioritization [2]. Conceptually, this suggests that automated assessment works best as part of a feedback ecosystem rather than as a stand-alone judge.

Pronunciation assessment tools follow a similar pattern. They provide instant scores and visualizations based on acoustic comparison with target models. These tools can increase practice volume and awareness of phonetic detail. However, pronunciation is not only acoustic accuracy; it is also intelligibility in interaction. Automated scoring systems do not fully capture listener comprehension or communicative adequacy. Here again, measurable performance and communicative success are related but not identical constructs.

A broader analytical issue concerns the feedback loop created by automated assessment. When feedback is constant and immediate, learners may become correction-driven. This can

support noticing but may also reduce tolerance for ambiguity and experimentation. SLA research has long emphasized that not all errors require immediate correction and that delayed or selective feedback can sometimes be more developmentally effective. Automated systems, by contrast, tend toward total coverage because their marginal cost per correction is near zero. Pedagogically, abundance of feedback is not always equivalent to quality of feedback [3].

Convergence and hybrid systems

Although chatbots, intelligent tutors, and automated assessment tools can be described separately, current AI platforms increasingly combine their functions. A single system may host dialogue practice, adaptive sequencing, and automated scoring within one interface. From a conceptual perspective, this convergence creates hybrid learning environments rather than isolated tools.

Large-scale reviews of AI in education note that such systems should be analyzed not only by technical architecture but also by instructional role and governance structure [4]. Questions arise about transparency, data use, and pedagogical control. Who defines learning goals – the curriculum, the teacher, or the algorithm? Who interprets performance data? These questions are no longer peripheral when AI systems become central learning environments.

For foreign language education, the key analytical move is to shift attention from novelty to function. Whether an AI tool uses simple pattern matching or advanced neural models matters less pedagogically than how it structures input, interaction, feedback, and learner choice. A conceptual typology helps keep this focus. It supports more precise discussion of opportunities and constraints and prepares the ground for evaluating AI integration against established language learning theories rather than against technological expectations alone.

Conclusion. The discussion developed in this article set out to examine artificial intelligence in foreign language learning not as a fashionable technological add-on, but as a phenomenon that interacts directly with established learning theories, pedagogical assumptions, and instructional roles.

Instead of evaluating particular platforms or reporting experimental outcomes, the analysis stayed at a conceptual level and traced how AI-related practices intersect with core constructs such as interaction, feedback, learner autonomy, mediation, and adaptation. Seen from this angle, AI is not simply another tool in the classroom. It functions as a structural influence that reshapes how language learning environments are orga-

nized, how support is delivered, and how responsibility is distributed between teacher, learner, and system.

One theoretical contribution of this study lies in reframing AI-supported language learning as a layered pedagogical environment rather than a single innovation. Across the previous sections, AI tools were grouped conceptually into conversational systems, intelligent tutoring structures, and automated assessment mechanisms.

Another contribution emerges from placing AI practices in dialogue with major theoretical traditions instead of treating them as theory-neutral.

Constructivist and sociocultural perspectives emphasize meaning-making through activity and interaction, while SLA frameworks highlight attention, input, output, and negotiation of meaning.

When AI systems provide instant correction, generate prompts, or personalize input streams, they participate in these processes in partial and uneven ways. They can amplify feedback frequency, but they cannot fully replicate socially situated mediation. They can increase opportunities for output, but not always for meaningful negotiation. They can support noticing, yet sometimes obscure underlying rules through opaque scoring. Mapping these mismatches helps avoid both exaggerated optimism and blanket skepticism.

The analysis also clarifies that adaptation in AI systems should not be automatically equated with pedagogical personalization.

Algorithmic adaptation is typically driven by measurable behavior: response speed, error rates, completion patterns. Pedagogical personalization, in contrast, often depends on interpretation, dialogue, and contextual judgment. Treating these as equivalent leads to conceptual confusion and inflated expectations. A more precise distinction supports more realistic instructional design.

AI can personalize pacing and difficulty with high efficiency. It is less reliable at interpreting intention, motivation, or communicative nuance. Recognizing this boundary is not a criticism of technology but a clarification of function.

The article further contributes by bringing together opportunity and limitation within a single analytical frame.

Discussions of AI in language education often split into celebratory or cautionary narratives.

One emphasizes scalability, access, and efficiency. The other stresses depersonalization, bias, and over-automation. Keeping these strands separate weakens both. When examined together, they reveal tensions that are theoretically produc-

tive. For example, automated feedback increases immediacy but may reduce reflective processing. Chatbot interaction increases practice opportunities but may simplify discourse patterns. Automated scoring increases consistency but may narrow what counts as acceptable performance. These tensions point to design questions rather than yes-or-no judgments.

From a pedagogical perspective, the most significant shift identified across the analysis concerns the redistribution of roles.

Teachers are no longer the sole providers of feedback, input selection, and practice control. Learners are no longer dependent only on classroom interaction for response and correction. Systems now participate in instructional moves that were historically human. This does not eliminate the teacher's role, but it transforms it. The teacher becomes more of an interpreter, mediator, and designer of learning trajectories in which AI components are embedded. Theoretical models that ignore this redistribution risk describing a classroom that no longer fully exists.

At the same time, the study argues against viewing AI as an autonomous instructional agent.

Across theoretical traditions, learning remains tied to interpretation, intention, and social positioning. AI systems operate through pattern detection and probabilistic output, not pedagogical understanding. They can simulate dialogue without sharing goals, generate correction without diagnosing causes, and recommend tasks without grasping learner histories beyond recorded traces. The theoretical implication is that AI participation in learning environments is instrumental and structural, not intentional. Keeping that distinction visible prevents category errors in both research and practice.

Accessibility of interpretation has been another guiding principle in this article. AI in education is often discussed in highly technical terms, which can distance language teachers and applied linguistics researchers from the conversation. By translating technological functions into pedagogical categories – feedback timing, interaction type, mediation depth, adaptation logic – the analysis opens space for broader disciplinary engagement. Theoretical reflection becomes more usable when it connects system behavior to familiar learning constructs rather than to engineering detail.

Several directions for further research follow naturally from this conceptual groundwork. One promising path involves closer alignment studies between AI feedback types and SLA feedback taxonomies.

Not all corrective feedback operates in the same way, and automated systems currently

blur distinctions between recasts, prompts, and explicit correction. Empirical and theoretical work that maps AI feedback onto established feedback categories could sharpen both tool design and evaluation criteria.

Another research direction concerns interaction quality in AI-mediated dialogue. Current systems can sustain exchanges, but the discourse properties of these exchanges vary widely. Future work could examine how AI dialogue differs from peer or teacher interaction in terms of negotiation moves, uptake patterns, and discourse complexity. Such research would help clarify where AI conversation is pedagogically equivalent, complementary, or insufficient.

There is also room for deeper investigation into learner agency under conditions of algorithmic guidance. Adaptive systems recommend paths and next steps, but how learners interpret and accept these recommendations remains underexplored.

Research that combines learner perception, decision-making, and system transparency could illuminate when adaptation supports autonomy and when it quietly reduces it.

Teacher cognition represents another important area. As AI tools enter classrooms, teachers develop working theories about their reliability, usefulness, and risk.

Studying how teachers conceptualize AI support – whether as assistant, evaluator, or competitor – can reveal how integration actually unfolds. This line of inquiry connects technology adoption with professional identity and pedagogical judgment.

Ethical and governance questions will likely expand as AI systems become more embedded in assessment and placement decisions. Conceptual and policy-oriented research is needed on fairness in automated language evaluation, data use boundaries, and accountability structures. These questions are not external to pedagogy; they influence trust, acceptance, and legitimacy of instructional decisions.

Longitudinal perspectives are also needed. Much current research focuses on short-term interventions or pilot uses. Language development, however, is extended and cumulative. Studies that examine AI-supported learning over longer periods could test whether early efficiency gains translate into durable competence, strategic awareness, and transfer across contexts.

Cross-context comparison offers another valuable direction. AI-supported language learning appears differently in higher education, school settings, corporate training, and independent learning platforms. Theoretical models should be tested against this diversity rather than

built on a single context. Variation in goals, constraints, and learner profiles may significantly affect how AI functions pedagogically.

Interdisciplinary collaboration will be especially important going forward. Work that connects applied linguistics, learning sciences, human-computer interaction, and educational data analysis can produce more robust models than discipline-bound approaches. Theoretical clarity improves when multiple perspectives examine the same learning event through different lenses.

Overall, the central claim emerging from this study is that artificial intelligence should be treated as a pedagogically consequential layer in contemporary language learning environments.

It changes timing, scale, and structure of feedback and practice. It modifies how adaptation is implemented. It redistributes instructional roles. These changes deserve theoretical interpretation, not only technical description.

Conceptual analysis helps distinguish what is genuinely new from what is a new delivery mechanism for familiar processes.

A balanced theoretical stance neither celebrates nor rejects AI as such. It asks more specific questions: What learning mechanisms

are being supported here? Which are being weakened? Where is mediation occurring, and who controls it? Which forms of interaction are expanded, and which are simplified? Framing the discussion at this level supports more careful research design and more responsible pedagogical choices.

The field of foreign language education has repeatedly adapted to technological change, from language laboratories to multimedia environments to networked communication.

AI represents another such shift, but one that reaches deeper into decision-making and feedback structures. That depth makes theoretical engagement especially necessary. Conceptual work of the kind developed here cannot replace empirical research, but it can guide it – by clarifying constructs, identifying tensions, and sharpening questions worth testing.

The continuing task for researchers and educators is not simply to decide whether to use AI tools, but to understand how their use reorganizes learning conditions.

Careful theory-informed analysis supports that understanding and keeps pedagogical purpose in focus while technology evolves.

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