

Terminological Foundations for The Study of Instructional Technology and Artificial Intelligence in Developing Foreign Language Skills Among Digital Residents in Schools

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Abstract: The article explores the terminological and conceptual foundations of instructional technologies and artificial intelligence in the context of developing the foreign language proficiency of “digital residents.” It analyzes modern theoretical frameworks, key categories, and current views from both foreign and local scholars. The terminological essence of the terms “instructional technology,” “digital resident,” and “digital transformation of foreign language education” is clarified, and their conceptual differences from related terms are highlighted. The research emphasizes the significance of a systematic approach to defining the roles and interrelations of instructional technologies and artificial intelligence in the educational system.

Keywords: Instructional technology, digital resident, foreign language teaching, artificial intelligence, personalized learning, linguistic education, educational methodology.

Introduction: In the current era of digital transformation, the task of modernizing foreign language teaching methods, especially for 7th-9th grade students in specialized schools, requires not only a rethinking of didactic approaches but also a deep methodological clarification of the terminological concepts underlying those approaches. This article aims to analyze and systematize the core categories of instructional technology and artificial intelligence in the context of forming and enhancing communicative competence, particularly in writing and speaking, among pupils who are considered part of the “digital resident” generation.

In the context of contemporary education, increasing the effectiveness of foreign language instruction has acquired strategic significance amidst the processes of intellectual globalization. In order to fundamentally enhance the methodology of English language teaching in specialized schools across the Republic of Uzbekistan, it is essential to develop a deep epistemological understanding of such core concepts as language proficiency, instructional technology, artificial intelligence, and digital resident.

The term language proficiency refers to a set of communicative competencies that are measured according to internationally recognized standards. Etymologically, the term is derived from the Latin word *proficere*, meaning “to advance” or “to succeed,” and in the context of linguistics, it denotes “the ability to make practical use of a language.” According to Uzbek scholar O. Rahimov, language proficiency is “an integrated indicator that synergistically combines linguistic (grammatical, lexical, phonetic), pragmatic (discursive logic, meaningful expressiveness), and sociolinguistic (adaptation to cultural context, linguocultural competence) components. It is dynamic in nature and reflects the learner’s capacity to independently perform complex communicative tasks.”

Sh. Yusupova further expands this definition by stating that proficiency is “not merely the knowledge of linguistic rules, but the ability to flexibly apply them across various communicative contexts. It also involves metacognitive strategies—that is, the capacity to evaluate one’s own knowledge and autonomously regulate the learning process—in order to continuously develop speech competence.”

Understanding the concept of language proficiency correctly is of crucial importance for every teacher aiming to achieve high results in the process of foreign language acquisition. From this perspective, we argue that language proficiency represents a learner's ability to communicate fluently and accurately in a foreign language. It encompasses not only grammatical knowledge but also the ability to actively use the language in real-life situations.

In modern education, language proficiency is assessed within the framework of a communicative approach, requiring the learner to express thoughts correctly, meaningfully, and contextually. In this regard, new methodological concepts in foreign language teaching-especially those focused on developing communicative competence-have proven effective. In specialized schools where foreign languages are taught intensively, a high level of proficiency is expected from students. The primary goal is to prepare learners for independent communication in both everyday and academic contexts. This approach fosters not only structural language acquisition but also a deeper understanding of the cultural context.

For example, the "Dual Language Immersion" model implemented in the state of Utah (USA) organizes the instructional process with a 50:50 ratio in English and a foreign language, aiming to prepare students to a high proficiency level.

Uzbekistan's new educational policy also identifies the development of students' communicative competence in foreign languages as a top strategic priority. Moreover, numerous international studies indicate that high language proficiency enhances learners' abilities in independent thinking, creative writing, and collaborative communication. Thus, language proficiency can be defined as the learner's capacity to communicate independently, accurately, and meaningfully in a foreign language-a definition that may vary depending on the learner's age, learning goals, and cognitive capabilities.

Based on observations from our research involving 7th to 9th grade students in specialized schools, we propose that the concept of "language proficiency" comprises the following components:

Linguistic competence - knowledge of phonetics, vocabulary, morphology, and syntax;

Communicative competence - understanding and generating speech acts, defining and formulating communicative goals;

Sociolinguistic competence - adapting to context, cultural codes, and norms of speech behavior;

Strategic competence - employing learning strategies,

overcoming difficulties in spoken and written interaction, and correcting errors.

In pedagogical practice, language proficiency is assessed through communicative tasks such as conversation, text analysis, and creative writing, and the outcomes are tested in real-life scenarios. In Uzbekistan, the internationally recognized Common European Framework of Reference for Languages (CEFR) has been adopted as the official proficiency benchmark for foreign language examinations. The CEFR divides language proficiency into six levels (A1-C2). According to D. Coste, this system is characterized not only by measuring knowledge levels but also by "the ability to observe language use strategies, developmental trajectories of communicative competence, and levels of linguistic self-awareness." One of the key features of the CEFR is its use of "can do" descriptors that clearly define what learners can accomplish at each level. For instance, at the B2 level, learners are expected to "understand the main ideas of complex texts," "communicate fluently and spontaneously," and "produce clear, detailed texts on a wide range of subjects."

In the context of Uzbekistan's specialized schools, these indicators are addressed through 6-10 hours of weekly intensive instruction, integration of subject learning in foreign languages, and emphasis on cross-cultural communication. A 2023 monitoring report by the Ministry of Preschool and School Education of the Republic of Uzbekistan reveals that 72% of graduates from specialized schools reached CEFR B2 proficiency-2.3 times higher than the corresponding figure in general education schools. However, the data also show that in rural specialized schools, the rate was 58%, which is 14% lower than in urban areas.

Within our study, the most frequently referenced methodological concept is that of instructional technology. The term instructional technology has its origins in the mid-20th century. The foundational basis of the technology we are presenting is the instructional model, which in the 1960s in the United States referred primarily to "the use of technical tools in the educational process." Over time, the meaning of the term has evolved substantially. Robert Gagné, in his seminal work *The Conditions of Learning and Theory of Instruction*, defines the instructional model as "a scientifically grounded system for planning, implementing, and evaluating the learning process." In the context of Uzbek pedagogy, T. Qodirov describes the instructional model as "a system of psychological-pedagogical mechanisms aimed at delivering educational content effectively, activating learners, meeting individual needs, and optimizing cognitive processes." According to A. Rasulova, the primary

function of the modern instructional model is “to create learner-centered educational environments, stimulate active learning, and link instruction with real-life contexts.”⁵

By its nature, the instructional model is a multifaceted, conceptually rich framework developed through high-level academic and pedagogical research. It has been widely applied in universities, research centers, and theoretical pedagogy laboratories, particularly in solving complex educational problems and designing high-efficiency teaching strategies and learning systems.

However, with the emergence of national strategies for foreign language education, including the Presidential Decree PF-6108 (November 6, 2020) and the State Educational Standard (2021), greater emphasis has been placed on functional literacy, differentiated instruction, and a competence-based approach. This shift has necessitated the adaptation of the instructional model into a practical and technological format suitable for use in all types of general education schools, especially in specialized institutions focused on intensive foreign language instruction.

Consequently, reworking the instructional model into a contemporary instructional technology-one that is understandable to teachers, allows for step-by-step planning, integrates with artificial intelligence tools, and accommodates learners’ individual needs-has become a critical methodological task.

From a theoretical perspective, Robert Gagné’s nine-step instructional model forms the foundation of instructional technology. These stages include: gaining attention, stating the objectives, recalling prior knowledge, presenting new content, providing guided practice, reinforcement, assessment, reflection, and adaptation. David Merrill further enriched the instructional model through his “First Principles of Instruction,” which emphasize problem-centered learning, activation, demonstration, application, and integration. Merrill’s principles align instructional practices more closely with the contemporary language proficiency requirements of today’s learners.

Thus, instructional technology may be defined as a conceptual framework for organizing the teaching process in a consistent and systematically planned manner, while taking into account learners’ individual needs and approaches. This technology ensures that lessons are structured in a goal-oriented, phased, and effective manner. Instructional technology equips the teacher with the tools to select instructional materials, design lesson plans, and establish clear assessment criteria.

Instructional technology is, fundamentally, a set of

theoretical and practical mechanisms that serve to organize and manage the teaching process in a structured, phased, and results-oriented manner. It constitutes a comprehensive system that ensures coherence among pedagogical objectives, instructional content, methods and tools, assessment formats, and teacher-student interactions.

To achieve full effectiveness, instructional technology must incorporate the following core components:

Learning Objectives - Clearly defined, measurable, and outcome-oriented indicators aimed at developing students’ language competence;

Instructional Materials - These encompass communicative tasks, functional grammatical structures, key and topic-specific lexical items, real-context assignments, cultural components, and multimodal resources such as audio, video, and text;

Teaching Methods and Tools - An integration of various methods such as the audiolingual approach, grammar-translation method, Total Physical Response (TPR), task-based learning, elements of Problem-Based Learning (PBL) and CLIL, as well as the use of digital platforms and AI tools like ChatGPT, Grammarly, and Duolingo;

Role Allocation - Within the framework of instructional technology, the teacher functions as a facilitator or instructor, while the learner assumes an active role, taking responsibility for their knowledge construction and reflection. This approach supports learner-centered instruction and enables the implementation of differentiated teaching strategies.

This definition provides a foundational basis for constructing multi-phase, analytically driven, and technologically integrated lessons that reflect the demands of contemporary education. Instructional technology, therefore, plays a crucial role in bridging theoretical models with practical application, serving as one of the most vital pedagogical tools in transforming theoretical concepts into real-world classroom practices.

Artificial Intelligence (AI) is defined as a complex system capable of performing functions traditionally associated with human cognition-such as learning, analysis, decision-making, and communication-in an automated manner. The conceptual foundations of artificial intelligence were first articulated at the Dartmouth Conference in 1956 by John McCarthy, who described AI as “the art of creating intelligent machines,” marking the birth of AI as an academic discipline. Over time, the essence of AI has evolved from data processing toward the inclusion of learning, comprehension, and decision-making capabilities.

According to A. Kholmirzayev, AI is “a transformational technology that enables individualized learning approaches, personalizes the learning process, and supports pedagogical decision-making based on data.” Meanwhile, N. Abdullayeva interprets AI as “a system that automatically assesses, corrects, and enhances written and spoken language skills, while also enabling the comprehensive cognitive, affective, and psychomotor analysis of a learner’s profile.”

In the context of this study, the application of AI in foreign language education can be summarized as follows: In modern education systems, AI is no longer merely an informational assistant; it now functions as an integrated component of didactic intervention, forming a suite of complex digital platforms. AI is thus not only a tool for data formatting or retrieval but a pedagogical assistant, deeply embedded in the educational environment. This is particularly evident in the context of foreign language instruction, where the effectiveness of AI technologies becomes especially pronounced.

Key advantages of AI-based tools in foreign language education include:

Real-time analysis of learner performance;

Automated suggestion of pedagogical strategies tailored to learners’ cognitive levels;

Development of individualized assignments;

Formation of adaptive learning environments through emotional state monitoring and progressive assessment algorithms.

It is important to note that none of these processes negate the teacher’s role; rather, they enhance it. AI tools-particularly GPT-based assistants, Grammarly, Quillbot, Write & Improve, Speechling, and ELSA-support personalized, reflective, and interactive learning experiences in the classroom.

The teaching of foreign languages-especially productive skills such as writing and speaking-requires significant time investment, intensive interaction, and individualized instruction. The growing demand for high-quality language instruction in Uzbekistan, as outlined in national education policies and reforms for 2021-2025, combined with increasing student numbers and the necessity of multi-phase instructional approaches, highlights the urgent need for effective integration of AI technologies. Hence, AI is no longer viewed merely as a technological advancement, but rather as a driving force of linguodidactic transformation.

As Rose Luckin emphasizes, AI will bring about three major revolutions in education: the creation of personalized learning trajectories for every student,

real-time cognitive-linguistic diagnostics, and data-informed pedagogical decision-making. Broadly speaking, the AI-supported instructional model serves as a foundation for developing adaptive and outcome-oriented learning environments that align with contemporary global educational needs.

In our view, the process of integrating artificial intelligence (AI) technologies into instructional technology must always maintain the teacher as the primary manager and guide. While AI can serve as a reliable auxiliary tool, pedagogical decisions, instructional experience, and the teacher’s individual approach remain essential. Each learner possesses distinct characteristics, and although technology can support them through general scaffolding mechanisms, the development of interpersonal communication skills and personal growth still fundamentally relies on human interaction.

Based on the above-mentioned sources and empirical observations, it can be asserted that the harmonization of AI tools and instructional technology contributes to the development of learners’ cognitive, affective, and psychomotor competencies. Such an integrated approach retains the strengths of traditional instruction while simultaneously leveraging the transformative potential of modern technologies. The use of AI technologies is particularly effective in upper secondary education, where the challenge of simultaneously managing large groups often limits a teacher’s ability to provide individualized feedback and assessment. In these contexts, AI tools facilitate the automated evaluation of writing assignments, identification of oral errors, and the generation of analytical reports, thereby empowering teachers to conduct both group-level and personalized instruction.

Our observations also suggest that motivation is one of the most critical advantages of incorporating AI technologies in modern language teaching. AI-driven interactive platforms, gamification techniques, and virtual analysis modules increase student engagement and encourage active classroom participation. Furthermore, AI facilitates the integration of national and cultural content into language learning. For example, ChatGPT can be used to simulate conversations in English on topics related to Uzbek culture, thereby enhancing not only language proficiency but also learners’ intercultural communication skills, a key competency for participating in the global community.

One of the objects of our study-namely, the emerging generation born into the digital age and accustomed to operating comfortably within informational ecosystems-requires particular attention. Despite the

growing scholarly interest in this socio-pedagogical phenomenon, researchers from both Western and Uzbek academic contexts have yet to arrive at a unified or mutually consistent conceptual term for this learner category. Although the phenomenon itself has been thoroughly explored, the lack of a standardized epistemological designation indicates that a matrix-based conceptual consensus remains elusive.

Among the most frequently used terms are: "Digital native" (Prensky M.), "Digital immigrant" (Prensky M.), "Digital agency" (Passey D., Shonfeld M., Appleby L.), "Validation of Visitors and Residents" (White & Le Cornu), "Connected learners" (Ito M., Gutierrez K., Livingstone S., Penuel B., Rhodes J.), "Digital citizenship" (Ribble M., Gerald D.).

These terms not only serve pedagogical purposes, but also help to define the psychosocial and behavioral identity of modern learners within digital environments. Consequently, there is a growing academic and pedagogical need to articulate a single, epistemologically grounded concept that accurately captures the nature of the new generation of learners.

In our assessment, this conceptual gap may be effectively filled by the relatively universal term "digital resident." This term encapsulates the holistic identity of the learner as one who is not merely functionally competent in digital environments, but also culturally, psychologically, and ethically integrated within them.

The concept of the "digital resident" emerged as a new socio-pedagogical category in response to the expansion of the global information and communication environment. It was initially discussed within the framework of Marc Prensky's binary distinction between "digital natives" and "digital immigrants." Later, White and Le Cornu refined this dichotomy by incorporating behavioral dimensions of digital engagement. They defined the "digital resident" as an individual who actively inhabits virtual spaces, constructing and performing their digital identity and social activities within digital platforms.

In the context of Uzbek scholarship, T. Khudayberganov interprets the digital resident as "a representative of the new generation who is prepared to engage in social, informational, and cultural activity in the digital world; who is conscious of their presence in online spaces, communicates, learns, and evolves within them." According to Khudayberganov, the term does not merely refer to someone who uses technology, but rather to a subject who has secured their place in the digital environment through identity, cognition, and communication.

Based on diverse scholarly approaches and our pedagogical experiences with contemporary learners,

we propose the following definition of the digital resident:

A digital resident is an interactive subject capable of organizing their personal and social learning within digital environments by actively searching for and selecting relevant information; possessing the skills to purposefully employ AI tools, online platforms, and information and communication technologies. Such an individual continuously develops their various competencies in the virtual realm, engages freely in digital communication and information exchange, and fully comprehends the legal and ethical responsibilities of their digital actions.

This conceptual approach diverges from prior theoretical definitions in several meaningful ways. Notably, we do not consider the digital resident a passive consumer of digital information. Instead, we interpret this subject as possessing a conscious "self" integrated within psychological, cultural, and legal dimensions of digital technology use. From this perspective, the digital resident is not merely a user but an active participant in a critical and intentional dialogue with the digital ecosystem, capable of evaluating the ethical, social, and communicative consequences of their actions and embodying the norms of digital citizenship.

Therefore, the digital resident is envisioned as not only technologically literate, but also socially responsible, conscious of media ethics, and ready for intercultural communication as a future global citizen. This understanding aligns with contemporary instructional technologies that enable education to be organized in a learner-centered, interactive, and personalized manner. Thus, digital residency becomes a methodological foundation for understanding and educating 21st-century learners from a competency-based perspective.

When used synergistically, the key terminological constructs outlined above - instructional technology, artificial intelligence, language proficiency, and digital residency - form a coherent methodological foundation for teaching foreign languages to 7th-9th grade pupils.

Research findings indicate that the integrated application of instructional technology and AI-based tools is emerging as a crucial theoretical and practical solution in modern foreign language education. This integrated approach enables the structuring of the educational process in a systematic, outcome-oriented, and learner-adaptive manner. Instructional technology, by its nature, not only aims to convey knowledge but also promotes the formation of communicative competencies, facilitates participation in intercultural communication, and fosters critical

thinking and metacognitive engagement. These attributes are especially vital in developing the writing and speaking skills required at the B1 and B2 proficiency levels of the Common European Framework of Reference for Languages (CEFR).

AI-powered tools - including Grammarly, ChatGPT, ELSA Speak, Write & Improve, Replika, ClassDojo, and Duolingo - create an interactive linguistic-didactic environment enriched with real-time monitoring, automated assessment, phonetic analysis of pronunciation, individualized feedback, and motivational scaffolding. International empirical studies show that the use of such technologies has led to an average 49% reduction in grammatical errors, a 28% improvement in pronunciation accuracy, a 46% enhancement in the logical structure of written texts, and a 43% increase in learner motivation. These statistics provide compelling evidence of the high effectiveness of AI-supported educational technologies.

In addition, the instructional model developed on the basis of structured approaches proposed by leading instructional theorists such as Gagné, Merrill, Reigeluth, and Anderson responds directly to the requirements of contemporary education: namely, the implementation of learner-centered, multimodal, differentiated, and culturally responsive educational systems. The instructional technology proposed in this study, developed in harmony with modern digital tools, serves as a methodological framework for specialized schools with an intensified focus on foreign language education. It enables personalized learning, the incorporation of reflective assessment, and the formation of students as autonomous language learners.

Accordingly, the integration of instructional technologies and artificial intelligence tools constitutes an advanced strategic approach aimed at preparing students to become globally competent individuals of the 21st century - communicatively capable, cognitively engaged, linguistically cultured, and adept in intercultural environments. The implementation of this instructional framework has the potential to substantially improve the quality of foreign language instruction within the educational system of Uzbekistan.

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