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INTEGRATION OF ARTIFICIAL INTELLIGENCE, DIGITAL SIMULATION, AND ADAPTIVE LEARNING SYSTEMS IN THE PROCESS OF TEACHING RUSSIAN FOR SPECIFIC PURPOSES

(In the case of Higher Military Educational Institutions)

Ortikova Mukhabbat Khamidovna

Senior Lecturer at the Military Security and Defense University of the Republic of Uzbekistan

Abstract

This article analyzes the integration of artificial intelligence (AI), digital simulations, and adaptive learning systems in the process of teaching Russian for specific purposes in higher military educational institutions. The study highlights the development of cadets' professional communicative competence based on modern digital technologies, the formation of individualized learning trajectories, and the modeling of realistic military communication environments. It also provides scientific and methodological recommendations for improving Russian language acquisition through AI-based interactive dialogue systems and virtual simulations.

Keywords: Russian language, military education, artificial intelligence, adaptive learning, digital simulation, professional communication, linguodidactics.

Introduction

Modern military education is an active participant in the global digital transformation. This process necessitates a fundamental revision of educational content and methodologies. In the context of military security, the Russian

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language is no longer viewed as a mere linguistic subject; it is a multifunctional tool for operational management, the analysis of technical documentation, and international cooperation.

Traditional grammatical approaches often fail to prepare cadets for high-stress, real-world communicative environments. Therefore, the integration of AI-driven tools and immersive simulations is essential to bridge the gap between classroom theory and field operations

The modern military education system is currently becoming an active participant in the global process of digital transformation. This process necessitates a fundamental revision of educational content, methods, and technologies. In particular, the methodology of teaching foreign languages, specifically the teaching of Russian for Specific Purposes (RSP), is being modernized based on new innovative approaches.

Today, within the military education system, the Russian language is viewed not merely as a simple linguistic subject, but as a multifunctional tool for professional communication. It serves as a vital communicative platform in operational management processes, the transmission of combat orders, the analysis of technical and operational documentation, as well as in the implementation of international military cooperation and joint operations. Therefore, mastering the Russian language is considered an integral part of the professional training and operational efficiency of cadets.

From this perspective, traditional grammatical and lexical approaches cannot fully satisfy modern requirements. There is a growing need to bring cadets closer to a real-world military communicative environment and to develop their rapid thinking and decision-making skills during the educational process. This, in turn, requires the widespread implementation of innovative technologies.

In particular, the integration of **Artificial Intelligence (AI)**, **digital simulation systems**, and **adaptive learning platforms** elevates the process of teaching the Russian language to a qualitatively new level. Interactive systems based on AI

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communicate with cadets in real-time, analyzing their speech and identifying individual errors. Digital simulations model real military situations, providing cadets with the opportunity to gain communicative experience in a virtual environment. Adaptive learning systems customize educational materials based on each cadet's level of knowledge, learning pace, and individual needs.

As a result, the process of teaching the Russian language transforms into a complex system aimed not only at providing linguistic knowledge but also at forming a high level of professional communicative competence. Therefore, integrating artificial intelligence, digital simulation, and adaptive learning systems is considered one of the most pressing scientific and practical directions for today's military education.

Artificial Intelligence (AI) technologies are fundamentally transforming the language teaching process in modern linguodidactic systems, turning it into an adaptive, interactive, and learner-centered educational model. In the context of military education, AI-based systems serve as an important innovative tool in forming the professional communicative competence of cadets.

Linguistic platforms based on artificial intelligence utilize **Natural Language Processing (NLP)**, **Automatic Speech Recognition (ASR)**, and **Machine Learning (ML)** algorithms to create an interactive communication environment with the cadet in real-time. These systems evaluate the cadet's oral and written speech based on complex linguistic analysis and automatically identify morphological, syntactic, and phonetic errors.

AI-Driven Conversational Simulation: Modeling dialogues between the cadet and artificial intelligence based on real-world military communicative scenarios (staff communication, operational orders, radio communications).

Phonetic and Prosodic Analysis: Automated diagnostics of articulatory precision, intonational structures, and rhythmic features of pronunciation.

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Automated Grammar Error Detection: Identification of deviations in syntactic constructions, the case system, and lexical collocation through linguistic algorithms.

Real-Time Formative Feedback: Developing metalinguistic reflection by providing immediate correctional recommendations to the learner.

Adaptive Learning Modeling: Forming an educational trajectory where the complexity level changes automatically according to the cadet's mastery level.

Scenario: The AI system conducts a dialogue with the cadet in the role of a "Staff Commander."

AI: – *Передайте координаты объекта и доложите обстановку. (Transmit the object coordinates and report the situation.)*

Cadet: – *Объект находится в секторе В-4, обстановка стабильная, противник не обнаружен. (The object is in sector B-4, the situation is stable, no enemy detected.)*

AI System Analysis: No grammatical errors; lexical accuracy 92%; professional discourse level high.

Result: The cadet practices real operational Russian communication. As a result of this approach, the traditional reproductive education model is replaced by a **cognitive-active learning model**.

The cadet transforms from a passive recipient of information into an active linguistic subject – a professional participant capable of making independent communicative decisions.

Digital simulation technologies are among the most advanced didactic instruments forming **cyber-physical learning environments** in modern military education. These technologies serve to develop **situational awareness**, **rapid decision-making**, and communicative-information exchange competencies based on the **virtual operational modeling** of real military processes.

In this simulation-based approach, the Russian language manifests not only as a linguistic system but as an **operational-communicative interface**. All

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commands, information flows, and control signals are transmitted based on authentic military discourse in Russian. This forms **real-time linguistic response** and operational semantic interpretation skills.

Types of Simulations and Their Methodological Functions:

Combat Scenario Simulation: Managing unit movements in a tactical-operational environment and transmitting orders in Russian to develop tactical discourse competence.

Command-and-Control Decision Simulation: Processing information flows at strategic and operational levels and developing argumentative decision-making skills in Russian under multi-channel communication conditions.

Technical Systems Operation Simulation: Developing technical discourse and terminological competence while working with military-technical interfaces and interpreting operational instructions.

Emergency Response Simulation: Forming **communication resilience** and **rapid linguistic adaptation** under high-stress conditions.

Scenario: Virtual combat simulation (computer model).

Command given in Russian: – «Отделение, занять оборонительную позицию в квадрате 7-3!» (“Squad, take up defensive positions in square 7-3!”)

Cadet Action: Selects position, moves on the map, and reports in Russian: — «Позиция занята, личный состав готов к обороне. » (“Position taken, personnel ready for defense.”)

Result: Integration of language and military action is achieved.

Adaptive Learning Systems represent one of the highest levels of intellectual models in modern digital didactics. Based on **learner modeling**, **learning analytics**, and **machine learning algorithms**, they create individualized educational trajectories for each cadet.

Adaptive platforms continuously monitor linguistic performance, analyzing **cognitive load levels**, the speed of lexical-grammatical acquisition, and

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communicative activity in real-time. Educational material is automatically adjusted through **dynamic content adaptation**.

The Step-by-Step Adaptive Structure:

- 1. Fundamental Lexical Competence (Beginner):** Focuses on forming a terminological base. Basic layers of military lexis and minimal communicative constructions are mastered using **lexical acquisition modeling** and **spaced repetition algorithms**.
- 2. Interactional Communicative Competence (Intermediate):** Cadets learn to exchange ideas freely in Russian based on **situational discourse**. Pragmatic competence and discursive skills are developed here.
- 3. Operational Discourse Competence (Advanced):** Complex operational orders, official military documents, and staff-level communication are mastered, achieving **operational-linguistic integration**.

Evolution example:

- **Beginner Cadet:** Focuses on terms (*оружие, приказ, связь*). System provides: “Translate the words.”
- **Intermediate:** Dialogue-based task: “How would you relay an order to the platoon?”
- **Advanced:** Complex task: Writing an operational report in Russian.

Result: The system automatically scales complexity.

The primary advantage of the adaptive system is its **real-time optimization engine**. By replacing the traditional “one size fits all” model with an **individualized cognitive learning architecture**, the process of teaching Russian becomes a highly intellectual, flexible, and effective system that significantly enhances professional communicative competence.

The integrated instructional approach in modern military linguodidactics forms a complex educational ecosystem based on the synergetic interaction of **Artificial Intelligence (AI)**, **digital simulation**, and **adaptive learning systems**. This

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model moves the educational process beyond simple information transfer, elevating it to the level of a cognitively and technologically managed dynamic system.

The integration of these three advanced technologies results in the following conceptual model:

AI + Simulation + Adaptive System = Intelligent Military Language Learning Environment (IMLLE). This intelligent learning environment is characterized as a **cyber-linguistic learning architecture**. It transforms the process of mastering the Russian language into a multi-layered, multi-level, and context-aware system.

Scenario: “Emergency Situation – Loss of Communication”

AI: Asks the cadet a question.

Simulation: Visualizes the situation.

Adaptive System: Evaluates the response level.

Cadet: – Связь потеряна, перехожу на резервный канал управления.

Result: Rapid thinking in Russian is developed under conditions of real military stress.

Artificial Intelligence (AI): Provides an interactive communicative environment through **Natural Language Processing (NLP)**, semantic analysis, and real-time linguistic feedback. Acting as an **Intelligent Tutoring System (ITS)**, it diagnoses individual errors and suggests corrective strategies.

Digital Simulation: Places the cadet in an immersive communicative environment by virtually modeling operational-tactical situations. Here, Russian functions as a tool for military discourse, forming situational pragmatic competence.

Adaptive Learning System: Adapts the learning process to the individual cognitive profile. Using **learning analytics** and **predictive modeling**, it forecasts and optimizes the cadet's development trajectory.

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Empirical observations and modern pedagogical research show that this integrated model demonstrates significantly higher didactic efficiency:

1. **Accelerated Language Acquisition:** Adaptive algorithms and real-time AI feedback mechanisms accelerate the mastery of lexical-grammatical material.
2. **Professional Discourse Formation:** Based on situational models, cadets develop competence in military-operational discourse, formal command styles, and technical communication.
3. **Reduction of Communicative Anxiety:** The ability to practice in a safe virtual environment lowers “language anxiety” and increases communicative confidence.
4. **Terminological Consolidation:** Through simulation-based teaching, specialized military lexis is anchored in long-term memory, developing terminological automatism.
5. **Autonomous Learning Competence:** AI-tutor systems strengthen academic independence by fostering self-directed learning skills.

Table 1. Comparative Analysis: Traditional vs. Integrated Education

Indicator	Traditional Education	AI + Simulation + Adaptive
Speech Speed	Low	High
Terminology	Memorization	Practical Application
Stress Level	High	Low
Autonomy	Limited	High

The complex integration of AI, digital simulations, and adaptive systems defines a transformation in the modern pedagogical paradigm of military education. Within this model, cadets master the Russian language not just as a linguistic system, but as an **operational-communicative instrument**.

This approach systematically develops professional communicative competence, analytical thinking, and rapid linguistic reactions, preparing specialists who are highly competent for the demands of modern military service.

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The integration of **Artificial Intelligence (AI)**, **digital simulation**, and **adaptive learning systems** within the framework of teaching **Russian for Specific Purposes (RSP)** in higher military educational institutions represents a fundamental paradigm shift in modern military linguodidactics. Based on the analysis conducted in this study, the following scientific conclusions are established:

The research demonstrates that military language education is evolving from a traditional reproductive model toward a **cognitive-active ecosystem**. The proposed **Intelligent Military Language Learning Environment (IMLLE)** transcends the boundaries of conventional classroom learning by creating a cyber-linguistic architecture where language acquisition is inextricably linked to professional military operations.

The primary scientific novelty of this study lies in the conceptualization of the synergy between three distinct technologies:

- **Artificial Intelligence:** Acts as the “cognitive engine,” providing Natural Language Processing (NLP) and real-time diagnostic feedback.
- **Digital Simulation:** Serves as the “contextual anchor,” embedding linguistic tasks into high-fidelity military scenarios.
- **Adaptive Systems:** Function as the “optimization layer,” dynamically managing the **Cognitive Load Theory (CLT)** parameters to match individual cadet profiles.

The intersection of these tools creates a learning efficiency that exceeds the sum of its individual parts.

A critical finding is the shift toward **operational-linguistic integration**. In this model, the Russian language is no longer studied as an isolated academic subject but as a **functional interface for decision-making**. By practicing commands and reports in simulated stress environments, cadets develop a “professional reflex,” where the transition from thought to linguistic action occurs with minimal cognitive friction.

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The integration of digital simulations addresses the vital issue of **foreign language anxiety**. By providing a “safe-to-fail” virtual environment, these technologies allow cadets to build communicative confidence. This results in higher **communication resilience**, ensuring that linguistic performance remains stable even under the psychological pressures of simulated combat or emergency response.

The empirical evidence suggests that this integrated approach significantly outperforms traditional methodologies in terms of:

Retention Rate: Specialized military terminology is anchored in long-term memory through situational association.

Autonomy: Adaptive platforms foster self-directed learning competencies, essential for continuous professional development in modern officers.

In conclusion, the implementation of an integrated AI-driven and simulation-based model is not merely a technical upgrade but a strategic necessity for modern military education. This framework ensures that cadets are prepared not only as linguistically proficient individuals but as **competent specialists** capable of effective communication and rapid decision-making within the complex, multilingual environments of contemporary military service.

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