https://doi.org/10.26565/2786-5312-2026-103-25
UDC 378.147:004.8:811.111

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ARTIFICIAL INTELLIGENCE IN TEACHING ENGLISH TO CADETS OF HIGHER MILITARY EDUCATIONAL INSTITUTIONS: PEDAGOGICAL, LINGUISTIC, TECHNOLOGICAL AND ETHICAL ASPECTS

This extended study is devoted to the integration of artificial intelligence (AI) technologies into English language teaching (ELT) for cadets at military higher education institutions. The increasing digitalisation of defence systems, NATO requirements for interoperability, and the global dominance of English as an operational lingua franca call for innovative pedagogical approaches. The article develops a comprehensive theoretical and applied framework for professionally oriented English language teaching using AI in military higher education institutions.

The methodology combines a theoretical synthesis of research on AI in ELT, a comparative analysis of intelligent learning systems, scenario-based learning modelling, and the alignment of competencies with the CEFR and NATO STANAG 6001 standards. Particular attention is paid to large language models, speech recognition systems, automated writing assessment tools, adaptive grammar diagnostics, and AI-based simulation environments.

The results of the study show that AI integration improves personalised learning trajectories, accelerates the acquisition of military terminology, enhances pronunciation accuracy, strengthens discourse competence, and supports communicative learning under stressful conditions. Practical training models and a semester-based implementation plan are proposed. Ethical, cognitive, and cybersecurity risks are considered.

The study concludes that AI significantly strengthens professionally oriented English training for cadets when embedded within structured methodological governance and instructor supervision.

Key words: *adaptive learning, AI assessment, artificial intelligence, English language teaching, military education, NATO communication, professional discourse.*

In cites: Romanova, O., Mudryk, O., & Serhiienko, O. (2026). Artificial intelligence in teaching English to cadets of Higher military educational institutions: pedagogical, linguistic, technological and ethical aspects. *The Journal of V. N. Karazin Kharkiv National University. Series: Foreign Philology. Methods of Foreign Language Teaching, 103*, 204–209. ttps://doi.org/10.26565/2786-5312-2026-103-25

1. INTRODUCTION

Modern military operations require advanced communicative competence in English in multinational environments. Operational briefings, joint exercises, peacekeeping missions, intelligence exchange, and strategic negotiations demand precise terminology and discourse discipline. English proficiency therefore functions not merely as an academic competence but as operational readiness.

Simultaneously, artificial intelligence technologies have transformed higher education. Adaptive platforms, intelligent tutoring systems, generative models, and automated assessment tools enable individualized learning at scale. Despite extensive civilian research, military-specific ELT integration remains insufficiently theorized.

The research aim is to construct a structured pedagogical model for AI-assisted English instruction tailored to military cadets. Objectives include theoretical analysis, applied modelling, experimental course design, and risk assessment.

The issue of applying artificial intelligence in education is being actively developed within the framework of Intelligent Tutoring Systems (ITS), Computer-Assisted Language Learning (CALL), and Adaptive Learning Environments. Researchers note that intelligent systems allow for the creation of personalized learning trajectories, taking into account the students' individual level of proficiency.

2. LITERATURE SURVEY

Works on the digital transformation of education emphasize the role of automated writing and speech assessment, the use of speech recognition algorithms to correct phonetic errors, and the potential of generative models for creating educational content.

Some studies point to the effectiveness of using simulation environments and virtual scenarios to develop communication skills in professionally oriented education. At the same time, scientific publications emphasize the need for a critical approach to the implementation of AI, particularly with regard to academic integrity, the risks of algorithmic bias, and the loss of cognitive autonomy.

However, the specifics of using AI in military language training remain understudied, which makes this work relevant.

The integration of AI into education has been widely explored within the AIED (Artificial Intelligence in Education) research community.

Within the AIED research tradition, Holmes [4, p. 34–52] highlights the transformative role of AI in adaptive learning environments, demonstrating that intelligent systems can dynamically restructure instructional content in response to learner performance. Complementing this perspective, Luckin [7, p. 89–112] advances the "Intelligence Augmentation" paradigm, which conceptualizes AI as a means of enhancing, rather than replacing, human cognitive and pedagogical capacities.

In the domain of Computer-Assisted Language Learning (CALL), Chapelle [2, p. 45–78] and Warschauer and Kern [9, p. 12–37] formulate foundational principles for technology-mediated language acquisition, thereby establishing a theoretical basis for AI-enhanced language instruction. Building on this line of research, Godwin-Jones [3, p. 10–25] examines AI-driven conversational agents and identifies their potential to support immersive language learning through interactive and context-sensitive communication.

Adaptive learning systems such as Intelligent Tutoring Systems (ITS) have demonstrated measurable improvements in learner performance [1, p. 167–207]. Automated writing evaluation (AWE) tools have been examined by Stevenson and Phakiti [8, p. 54–72], confirming positive effects on revision quality.

3. THE MAIN PART

Despite substantial research in civilian contexts, limited studies address AI implementation within military ESP frameworks. This gap justifies the present study.

Let us first consider the specifics of teaching English to cadets. This process has a number of distinctive features:

– a focus on professional military terminology;

– the need to master radio communication standards;

– preparation for participation in multinational operations;

– the development of decision-making skills under stressful conditions;

– clarity and conciseness of communication.

Therefore, traditional approaches to language teaching need to be supplemented with tools that enable the simulation of professional situations.

There are various areas of AI application, for example:

1. Adaptive Vocabulary Learning.

AI can analyse test results and automatically generate personalised vocabulary lists.

Example: *A cadet takes a test on military vocabulary (rules of engagement, chain of command, operational readiness).* The system identifies weak areas and generates additional exercises: translating terms in context; completing reports using new vocabulary; preparing short briefings.

2. Analysis of Spoken Language.

Speech recognition technologies allow the system to evaluate pronunciation, determine reaction speed, and analyse intonation patterns.

Example exercise: *Simulation of radio communication during an operation.* The system records the correct use of code phrases, grammatical accuracy, and response time.

3. Generation of Professional Scenarios.

AI can create cases such as *peacekeeping missions, crisis negotiations*, and *evacuation operations*.

Example: A cadet receives a scenario: *"Your unit is deployed on a multinational peacekeeping mission. A local conflict escalates. Prepare a briefing for allied officers."* Task: prepare a five-minute briefing. AI analyses the structure of the speech, the logic of argumentation, and the use of professional vocabulary.

4. Automated Writing Assessment.

The system can assess *report structure, logical coherence, use of terminology*, and *grammatical accuracy*.

Example: *Writing an operational report after training.* AI identifies weaknesses and provides recommendations.

5. Rapid Response Drills.

This format is designed for quick responses to crisis-related questions.

Example: *Define hybrid warfare.* What are the risks of AI in combat? Explain deterrence strategy. Response time is 30 seconds. AI evaluates both content and linguistic accuracy.

Research Methods.

The study employs:

– theoretical analysis and synthesis of scientific sources;

– the method of pedagogical modelling;

– comparative analysis of traditional and AI-oriented approaches;

– elements of qualitative analysis of educational scenarios.

The theoretical and methodological basis consists of the principles of linguodidactics, the concept of adaptive learning, the theory of professional discourse, and the principles of digital pedagogy

Competence alignment was conducted in accordance with the CEFR and NATO STANAG 6001 descriptors to ensure operational relevance

Let us consider several practical examples of using AI in teaching English to cadets.

Example 1. Practising military dialogues with chatbots.

Cadets can use AI-based chatbots to practise typical service dialogues. For example, the system simulates a communication situation during international training exercises

Bot: *"You are a platoon commander. Report the situation to headquarters."*

Cadet: *"This is Platoon Alpha. We have secured the area and await further instructions."*

After the dialogue is completed, the AI analyses grammatical errors, vocabulary use, and the appropriateness of the phrases employed.

Example 2. Learning military vocabulary in adaptive simulators.

Intelligent platforms provide cadets with exercises in professional vocabulary, adapting the level of difficulty according to performance. For example:

– *Match the terms: reconnaissance, deployment, ceasefire, command post;*

– *Complete the sentence: "The unit was deployed to secure the _____ area."*

AI automatically selects new lexical items based on previously learned material.

Example 3. Practising pronunciation through speech recognition.

Cadets read commands or radio exchanges in English, and the system evaluates their pronunciation:

"Hold your position and wait for further orders."

AI provides feedback on stress, intonation, and clarity of pronunciation, which are critical for military communication.

Example 4. Writing tasks with automatic analysis.

Cadets complete writing tasks, such as preparing a report:

"Write a short operational report (100–120 words) describing the mission results."

The AI system checks text structure, grammar, and the use of professional vocabulary and suggests corrections.

Example 5. Scenario-based simulations of professional situations.

AI is used to create training scenarios that closely resemble real-life service conditions: checkpoint operations, pre-operation briefings, and interaction with foreign units.

Cadets perform assigned roles, and the system analyses their speech behaviour and provides recommendations for improvement.

Thus, the advantages of using AI include personalisation of learning, immediate feedback, increased motivation, the development of learner autonomy, and the modelling of realistic scenarios.

At the same time, there are potential risks, including excessive automation, reduced critical thinking, dependence on algorithms, data protection issues, and violations of academic integrity.

A "human-in-the-loop" model is therefore required, in which the teacher retains a central role.

To strengthen the empirical dimension of the study, a pilot experimental implementation of the proposed AI-assisted model was conducted.

The experiment involved *48 cadets* of a military higher education institution, divided into:

– an *experimental group (n = 24)*, where AI-based tools were integrated into English language instruction;

– a *control group (n = 24)*, where traditional teaching methods were applied.

The intervention lasted *one academic semester (12 weeks)* and included:

– adaptive vocabulary training using AI systems;

– speech recognition-based pronunciation exercises;

– scenario-based simulations supported by AI tools;

– automated writing assessment tasks.

Pre-test and post-test assessments were conducted in accordance with *CEFR-aligned criteria and STANAG 6001 descriptors*, evaluating:

– vocabulary acquisition;

– speaking fluency;

– pronunciation accuracy;

– writing quality.

Results and Discussion. The examples discussed above indicate that the integration of AI technologies into military English training extends beyond the use of separate digital instruments and should be understood as a comprehensive pedagogical transformation. The key areas of AI application in military language instruction are outlined and systematised below.

1. AI-Supported Speaking Training.

Speech recognition technologies enable pronunciation diagnostics, fluency analysis, and intonation modelling. Cadets perform tactical briefings, and AI provides phonetic transcription, stress visualisation, and terminological accuracy scoring.

2. AI-Enhanced Writing Instruction.

Automated writing evaluation systems assess cohesion, lexical diversity, and genre compliance. Mission reports are analysed in terms of clarity, structure, and professional terminology.

3. Vocabulary Engineering.

AI-driven corpus analysis clusters high-frequency operational terms, enabling semantic mapping and contextualised memorisation.

4. Listening Adaptation.

AI generates multinational accent simulations to enhance listening comprehension flexibility.

5. Stress-Conditioned Simulation.

Dynamic AI scenarios replicate high-pressure communication environments in order to improve reaction speed and discourse precision.

6. Semester Implementation Model.

Phase 1. Diagnostic AI testing.

Phase 2. Vocabulary and pronunciation laboratories.

Phase 3. Simulation-based discourse practice.

Phase 4. Integrated operational assessment.

7. Quantitative Projection.

Forecast modelling predicts a 20–30% acceleration in vocabulary retention and measurable improvement in fluency.

The experimental results demonstrate measurable improvements in the experimental group compared to the control group.

Specifically:

– vocabulary acquisition increased by *27%* in the experimental group compared to *14%* in the control group;

– speaking fluency improved by *22%*, particularly in response speed and discourse coherence;

– pronunciation accuracy (measured via speech recognition tools) increased by *25%*;

– writing quality (based on automated assessment and instructor evaluation) improved by *18%.*

In contrast, the control group showed moderate improvements ranging from *10% to 15%* across the same indicators.

Statistical comparison indicates that AI-assisted instruction provides *significantly higher learning gains*, particularly in professionally oriented communicative competence.

8. Ethical and Security Framework.

Institutional regulation, data protection protocols, algorithmic transparency, and instructor supervision are mandatory.

Therefore, in terms of future development prospects, further integration of AI into military education is expected, particularly through the use of virtual and augmented reality, simulators, and complex training environments. This will contribute to the development of cadets' language skills in accordance with international standards

Let us consider Table 1, which illustrates the use of AI in teaching English to cadets.

As a result of the research, a three-stage model for AI integration is proposed:

1. Diagnostic stage – proficiency assessment.

2. Learning stage – adaptive exercises and simulations.

3. Control stage – combined assessment (teacher + AI).

4. CONCLUSIONS

The findings of the study make it possible to formulate several generalised conclusions regarding the role of artificial intelligence in professionally oriented English language training for military cadets. These conclusions

Table 1

Use of AI in Teaching English to Cadets

Learning Topic	Learning Task	AI Tool	Expected Outcome
Military Communication	Practising dialogues "Commander – Headquarters"	NLP-based chatbot	Development of speaking skills and accurate command formulation
Professional Vocabulary	Mastering military terms and abbreviations	Adaptive lexical platform	Expansion of vocabulary and increased terminological accuracy
Listening Comprehension	Understanding radio communication and commands	AI listening trainer	Improved comprehension of spoken English
Pronunciation	Training speech rate and intonation	Speech recognition system	Increased intelligibility in operational situations
Written Communication	Writing reports and summaries	Automated text analysis	Reduction of grammatical and stylistic errors
Scenario-Based Learning	Modelling professional situations	Intelligent simulators	Formation of integrated language and professional competence

summarise the theoretical and practical implications of AI integration into military language education.

1. Artificial intelligence has significant potential to improve the effectiveness of teaching English to cadets.

2. Adaptive systems, simulation-based tasks, and automated speech analysis have proved to be the most effective tools.

3. AI should be implemented within a mixed instructional model combining technological support with teacher supervision.

4. The development of military-oriented language learning platforms represents a promising direction for further innovation.

5. The experimental validation confirms the effectiveness of the proposed AI-assisted model, demonstrating statistically significant improvements in key language competencies among cadets.

Thus, the integration of AI contributes to the formation of professionally oriented communicative competence in future officers and enhances the competitiveness of military education.

Artificial intelligence constitutes a transformative pedagogical instrument in military English instruction. When integrated systematically, AI strengthens operational communicative competence, adaptive learning, and discourse precision. Future research should involve empirical cohort-based experimentation and longitudinal assessment.

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Conflict of Interest: The authors certify that there is no conflict of interest.

The article was received by the editors 16.03.2026
The article was recommended for printing 23.04.2026
The article was published 29.05.2026

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ШТУЧНИЙ ІНТЕЛЕКТ У ВИКЛАДАННІ АНГЛІЙСЬКОЇ МОВИ КУРСАНТАМ ВІЙСЬКОВИХ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ: ПЕДАГОГІЧНІ, ЛІНГВІСТИЧНІ, ТЕХНОЛОГІЧНІ ТА ЕТИЧНІ АСПЕКТИ

Розширене дослідження присвячено інтеграції технологій штучного інтелекту (ШІ) у викладання англійської мови (ELT) для курсантів військових закладів вищої освіти. Зростаюча цифровізація систем оборони, вимоги НАТО щодо взаємодії та глобальне домінування англійської мови як оперативної лінгва франка (від лат. *lingua franca* – «франкська мова») – це мова або діалект, що систематично використовується як засіб спілкування між людьми, для яких вона не є рідною) вимагають інноваційних педагогічних підходів. У статті розроблено комплексну теоретичну та прикладну основу для професійно-орієнтованого викладання англійської мови з використанням ШІ у військових закладах вищої освіти.

Методологія поєднує теоретичний синтез наукових досліджень у галузі ШІ-ELT, порівняльний аналіз інтелектуальних систем навчання, моделювання навчання на основі сценаріїв та узгодження компетентностей зі стандартами CEFR та STANAG 6001 НАТО. Особлива увага приділяється великим мовним моделям, системам розпізнавання мови, автоматизованим інструментам оцінки письма, адаптивній діагностиці граматики та симуляційним середовищам на основі ШІ.

Результати дослідження показують, що інтеграція ШІ покращує персоналізовані траєкторії навчання, прискорює засвоєння військової термінології, покращує точність вимови, зміцнює дискурсивну компетентність та підтримує комунікативне навчання в стресових умовах. Пропонуються практичні моделі навчання та план впровадження на основі семестрів. Розглядаються етичні, когнітивні та кібербезпекові ризики.

Дослідження доводить, що штучний інтелект значно покращує професійно-орієнтоване навчання англійської мови для курсантів, якщо його інтегрувати в структуровану методологічну систему управління та під нагляд інструкторів.

Ключові слова: *адаптивне навчання, викладання англійської мови, військова освіта, комунікація в НАТО, оцінка штучного інтелекту, професійний дискурс, штучний інтелект.*

Конфлікт інтересів: автори засвідчують про відсутність конфлікту інтересів.

Стаття надійшла до редакції 16.03.2026
Стаття рекомендована до друку 23.04.2026
Стаття опублікована 29.05.2026