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ARTIFICIAL INTELLIGENCE–DRIVEN ADAPTIVE BLENDED LEARNING FOR DEVELOPING ENGLISH LINGUISTIC COMPETENCE OF MILITARY CADETS

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ABSTRACT

This study aims to examine the development of cadets' English linguistic competence through an Artificial Intelligence–driven Adaptive Blended Learning methodology in military higher education institutions in Uzbekistan. It addresses three objectives: identifying cadets' initial English proficiency and learning needs, examining changes following the implementation of the proposed methodology, and comparing achievement patterns between experimental and control groups.

The study employed qualitative and quantitative methods, including theoretical analysis, comparative analysis, analysis and synthesis, a systematic approach, diagnostic and achievement testing, questionnaires, classroom observation, and expert evaluation. A 26-week pedagogical experiment involved 247 cadets from four military higher education institutions. The experimental group comprised 124 cadets, while the control group included 123. The assessment covered vocabulary, grammar, reading, listening, writing, and speaking. The experimental intervention combined face-to-face instruction, digital learning resources, individualized tasks, formative assessment, profession-oriented military English activities, and AI-supported learning and feedback using ChatGPT and Google Gemini.

The descriptive findings showed changes in achievement levels in both groups. In the experimental group, the proportion of cadets classified as "Excellent" increased from 7.3% before the intervention to 23.4% afterward, while the "Good" category rose from 12.9% to 37.1%. The proportion classified as "Unsatisfactory" decreased from 41.1% to 6.5%. In the control group, the "Excellent" category increased from 6.5% to 7.3%, whereas the "Good" category rose from 13.0% to 16.3%. These results indicate different descriptive patterns of change between the groups; however, statistical significance cannot be established from the reported descriptive data alone.

The study concludes that integrating adaptive blended instruction and AI-supported feedback may provide a useful framework for addressing cadets' individual learning needs and developing English linguistic competence. Further inferential analysis and longitudinal research are needed to establish the significance and sustainability of the observed changes.

Key words: artificial intelligence, blended learning, linguistic competence, military education, cadets, individualization, language assessment, feedback.

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HARBIY KURSANTLARNING INGLIZ TILIDAGI LINGVISTIK KOMPETENSIYASINI RIVOJLANTIRISHDA SUN'IY INTELLEKTGA ASOSLANGAN ADAPTIV ARALASH TA'LIM

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ANNOTATSIYA

Mazkur tadqiqot O'zbekistonning harbiy OTMlarida kursantlarning ingliz tilidagi lingvistik kompetensiyasini sun'iy intellekt vositalari bilan boyitilgan adaptiv aralash ta'lim metodikasi asosida rivojlantirishga bag'ishlangan. Tadqiqotning maqsadi kursantlarning dastlabki til bilish darajasi va ta'lim ehtiyojlarini aniqlash, taklif etilgan metodika qo'llanilgandan keyingi o'zgarishlarni o'rganish hamda tajriba va nazorat guruhlari natijalarini taqqoslashdan iborat.

Tadqiqotda nazariy va qiyosiy tahlil, tahlil va sintez, tizimli yondashuv, diagnostik va yakuniy testlar, so'rovnomalar, dars jarayonini kuzatish hamda ekspert baholash usullaridan foydalanildi. Pedagogik tajriba-sinov ishlari O'zbekistonning to'rtta harbiy OTMda 247 nafar kursant ishtirokida 26 hafta davomida o'tkazildi. Tajriba guruhiga 124 nafar, nazorat guruhiga esa 123 nafar kursant jalb qilindi. Baholash lug'at boyligi, grammatika, o'qish, tinglab tushunish, yozish va gapirish ko'nikmalarini qamrab oldi. Tajriba guruhida an'anaviy mashg'ulotlar raqamli ta'lim resurslari, individual topshiriqlar, joriy baholash, harbiy kasbga yo'naltirilgan ingliz tili mashg'ulotlari hamda ChatGPT va Google Gemini vositalari yordamida o'rganish va fikr-mulohaza olish bilan uyg'unlashtirildi.

Tavsifiy natijalarga ko'ra, tajriba guruhida "a'lo" darajadagi kursantlar ulushi 7,3 foizdan 23,4 foizga, "yaxshi" darajadagilar ulushi esa 12,9 foizdan 37,1 foizga oshdi. "Qoniqarsiz" darajadagi kursantlar ulushi 41,1 foizdan 6,5 foizga kamaydi. Nazorat guruhida ushbu ko'rsatkichlar mos ravishda 6,5 foizdan 7,3 foizga, 13,0 foizdan 16,3 foizga o'zgardi. Biroq faqat tavsifiy ma'lumotlar asosida farqlarning statistik ahamiyatini tasdiqlab bo'lmaydi.

Xulosa qilib aytganda, adaptiv aralash ta'limni sun'iy intellekt vositalari yordamidagi fikr-mulohaza bilan uyg'unlashtirish kursantlarning individual ta'lim ehtiyojlarini hisobga olish va ingliz tilidagi lingvistik kompetensiyasini rivojlantirish uchun istiqbolli yondashuv bo'lishi mumkin. Olingan natijalarning statistik ahamiyati va barqarorligini aniqlash uchun qo'shimcha statistik tahlil hamda uzoq muddatli tadqiqotlar talab etiladi. Shuningdek, mazkur yondashuv kursantlarning til o'rganish jarayonidagi faolligini oshirish va o'zlashtirishdagi individual farqlarni hisobga olishga xizmat qilishi mumkin. Tadqiqot natijalari harbiy OTMlarida ingliz tilini o'qitish metodikasini takomillashtirish uchun amaliy ahamiyatga ega.

Kalit so'zlar: sun'iy intellekt, aralash ta'lim, lingvistik kompetensiya, harbiy ta'lim, kursantlar, individuallashtirish, til baholash, teskari aloqa.

АДАПТИВНОЕ СМЕШАННОЕ ОБУЧЕНИЕ НА ОСНОВЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА ДЛЯ РАЗВИТИЯ ЛИНГВИСТИЧЕСКОЙ КОМПЕТЕНЦИИ КУРСАНТОВ В АНГЛИЙСКОМ ЯЗЫКЕ

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АННОТАЦИЯ

Исследование посвящено развитию лингвистической компетенции курсантов по английскому языку в высших военных образовательных учреждениях Узбекистана на основе

адаптивной модели смешанного обучения с использованием средств искусственного интеллекта. Цель исследования заключается в определении исходного уровня владения английским языком и образовательных потребностей курсантов, изучении изменений после внедрения предложенной методики и сравнении результатов экспериментальной и контрольной групп.

В исследовании использовались теоретический и сравнительный анализ, анализ и синтез, системный подход, диагностическое и итоговое тестирование, анкетирование, наблюдение за учебным процессом и экспертная оценка. Педагогический эксперимент продолжался 26 недель и охватил 247 курсантов четырёх высших военных образовательных учреждений Узбекистана. В экспериментальную группу вошли 124 курсанта, в контрольную – 123. Оценивание включало проверку словарного запаса, грамматики, чтения, аудирования, письма и говорения. В экспериментальной группе очные занятия сочетались с цифровыми образовательными ресурсами, индивидуальными заданиями, текущим оцениванием, занятиями по английскому языку с учётом военной профессиональной направленности, а также обучением и получением обратной связи с использованием ChatGPT и Google Gemini.

Описательные результаты показали изменения уровня достижений в обеих группах. В экспериментальной группе доля курсантов с оценкой «отлично» увеличилась с 7,3% до 23,4%, а доля курсантов с оценкой «хорошо» – с 12,9% до 37,1%. Доля курсантов с неудовлетворительными результатами снизилась с 41,1% до 6,5%. В контрольной группе доля результатов «отлично» выросла с 6,5% до 7,3%, а результатов «хорошо» – с 13,0% до 16,3%. Вместе с тем приведённых описательных данных недостаточно для подтверждения статистической значимости выявленных различий.

Таким образом, сочетание адаптивного смешанного обучения с обратной связью, предоставляемой с помощью средств искусственного интеллекта, может стать перспективным подходом к учёту индивидуальных образовательных потребностей курсантов и развитию их лингвистической компетенции по английскому языку. Для установления статистической значимости и устойчивости выявленных изменений необходимы дополнительный статистический анализ и долгосрочные исследования.

Ключевые слова: искусственный интеллект, смешанное обучение, лингвистическая компетенция, военное образование, курсанты, индивидуализация, оценивание языка, обратная связь.

INTRODUCTION

Foreign language education has become one of the priority areas of modern higher education. This is particularly important in military higher education institutions, where English is regarded not only as an academic discipline but also as an essential professional tool for future officers. In today's military environment, officers may need to communicate during multinational operations, participate in international training programmes, work with professional military documentation, and exchange information with foreign partners. Therefore, English language teaching in military education should not be limited to grammatical knowledge. It should help cadets develop the ability to understand and use language accurately and appropriately in professional situations. In this context, the development and assessment of English linguistic competence has become an important issue.

The theoretical foundations of linguistic competence have been widely discussed by foreign and national scholars. One of the founders of this concept was N.Chomsky, who described linguistic competence as a speaker's internal knowledge of the grammatical system of a language and distinguished it from actual language performance [Chomsky, 1965, 1986]. This distinction became an important basis for

later discussions of language ability and language use.

D.Hymes expanded this understanding by introducing the concept of communicative competence. He argued that knowing a language involves more than knowing its grammatical rules. A speaker should also know how to use language appropriately in different social and cultural situations [Hymes, 1972, 1974].

M.A.K. Halliday approached language from a functional perspective and viewed it as a social resource for creating meaning. From this perspective, language competence develops through meaningful interaction and the ability to perform different communicative functions [Halliday, 1973, 1978].

M.Canale and M.Swain developed the competence-based approach further by identifying grammatical, sociolinguistic, and strategic competence as important components of communicative competence [Canale & Swain, 1980]. M.Canale later added discourse competence to the framework [Canale, 1983]. These approaches are important for language assessment because they show that language ability cannot be measured only through separate grammar or vocabulary questions. Effective assessment should also consider how learners understand and use language in meaningful communication.

The development of language assessment has therefore moved from a mainly grammar-based approach toward a broader evaluation of language performance. The Common European Framework of Reference for Languages provides one of the widely used frameworks for describing and assessing language proficiency. Its descriptors consider language activities such as reception, production, interaction, and mediation and allow learners' progress to be described according to different levels of proficiency [Council of Europe, 2020]. This approach is especially relevant to higher education because it allows assessment to be connected with actual learning outcomes rather than only with knowledge of language rules.

Previous research also shows that different aspects of language competence can be assessed through different types of tasks. Vocabulary and grammar can be examined through structured and contextualized tests, while reading and listening can be assessed through comprehension tasks. Writing and speaking require more productive forms of assessment because they involve the learner's ability to produce language independently. In this case, assessment can include criteria such as accuracy, range of vocabulary, grammatical control, coherence, pronunciation, fluency, and the appropriateness of language use. For military learners, these criteria need to be connected with professional situations, because a cadet may know a grammatical structure but still experience difficulties when using it to give instructions, understand a report, describe an operational situation, or communicate with an international colleague.

Worldwide, the integration of artificial intelligence into blended learning has also received increasing attention. H.Hamadneh demonstrated that artificial intelligence can be used to predict students' academic performance in blended-learning environments, highlighting its potential for identifying learning patterns and supporting instructional decisions [Hamadneh, 2022]. F.Peng, Y.Wang and Y.Hu examined the role of AI-

supported approaches in blended learning and emphasize the importance of ICT use and institutional support for improving students' learning outcomes [Peng et al., 2023]. I.Kobicheva and Y.Baranova reported that the integration of AI chatbots into blended learning can positively influence students' attitudes, satisfaction, perceived usefulness, intention to continue learning, and academic performance [Kobicheva & Baranova, 2024]. H.Ji, Y.Suo and Y.Chen also highlight the role of AI-based performance assessment in blended learning, particularly its relationship with students' continuous learning motivation [Ji et al., 2024]. Together, these studies indicate that AI-supported blended learning can strengthen personalized learning, performance assessment, learner engagement, and academic achievement.

Recent research has increasingly examined the role of generative artificial intelligence (AI) in foreign language education, particularly in personalized instruction, adaptive learning, and the development of language skills. Systematic reviews indicate that empirical research on generative AI has expanded considerably, with growing attention to language-skill development, feedback, and pedagogical integration [Li et al., 2025]. AI-driven adaptive platforms have also been investigated for their potential to tailor language learning to learners' proficiency levels and individual needs [Qu, 2025]. Research further highlights the importance of self-regulated learning when AI tools are incorporated into foreign language education [Hou & Zhou, 2025]. In addition, AI-supported language instruction raises questions about learners' critical thinking and the pedagogical conditions required for effective technology use [Liu et al., 2025]. Systematic reviews have also explored the roles of generative AI in language classrooms, including its use for feedback, tutoring, and interaction [Lee et al., 2026], as well as its broader applications and effects in English as a foreign language learning [Tang & Zhang, 2026]. Recent evidence syntheses have examined AI integration in EFL and ESL education and emphasized the importance of pedagogically guided implementation [Uygun & Demir, 2026]. At the same time, researchers have drawn attention to educational equity and unequal access to AI-supported learning opportunities [Cong-Lem et al., 2025]. Research on AI-supported task-based language teaching has also investigated how instructional design and learner-related factors may influence learning outcomes [Li et al., 2026]. Collectively, these studies provide a basis for investigating AI-driven adaptive blended learning for developing military cadets' English linguistic competence, while its effectiveness in military higher education requires context-specific empirical evaluation.

However, the analysis of the available literature shows that there is still a need for more research on how English linguistic and communicative competence can be assessed and developed specifically among military cadets. General language assessment frameworks provide useful principles, but military education has its own professional requirements. Cadets need to use English not only in everyday or academic situations but also when understanding military terminology, receiving and giving information, preparing professional documents, participating in joint activities, and communicating in situations related to their future duties. Therefore, assessment should take into account both general language proficiency and professional

communication needs.

In the Uzbek military education context, this issue is also important because cadets have different levels of language preparation and different difficulties in developing individual skills. The diagnostic stage of the present study showed the need to examine vocabulary, grammar, reading, listening, writing, and speaking rather than relying on one form of assessment alone. The study therefore considers linguistic competence as an integrated construct and examines its phonological, morphological, lexical, and syntactic dimensions together with practical language skills.

Despite the growing body of research on linguistic competence, communicative competence, language assessment, and technology-supported language learning, relatively limited attention has been given to the development and assessment of English linguistic competence through artificial intelligence-supported adaptive blended learning in military higher education. This study seeks to address this gap by proposing an Artificial Intelligence-driven Adaptive Blended Learning methodology for cadets. The main objective is to examine the theoretical foundations of English linguistic competence, consider appropriate ways of assessing its development, and demonstrate the pedagogical value of integrating artificial intelligence, adaptive learning, and blended instruction into English language education for military cadets.

Research questions

To achieve the aim of the study and guide the empirical investigation, the following research questions were formulated:

1. *What are the initial levels of English linguistic competence and the main English learning needs of cadets in military higher education?*

2. *How does the implementation of the Artificial Intelligence–driven Adaptive Blended Learning methodology affect the development of cadets' English linguistic competence?*

3. *What differences can be identified between the experimental and control groups in the development of cadets' English linguistic competence after the intervention?*

METHODS

This study employed a combination of qualitative and quantitative research methods to investigate the development of English linguistic competence among cadets through an Artificial Intelligence–driven Adaptive Blended Learning methodology.

Theoretical analysis was used to examine national and international literature related to linguistic competence, artificial intelligence in education, adaptive learning, blended learning, military English, and competence-based language instruction. The analysis of previous studies made it possible to identify the theoretical foundations of English linguistic competence and determine the key pedagogical principles underlying the proposed methodology.

The comparative method was applied to compare the theoretical perspectives of leading scholars namely N.Chomsky, D.Hymes, M.A.K. Halliday, M.Canale, and M.Swain. This comparison helped identify both common and distinctive features of different approaches to linguistic competence and provided a comprehensive

theoretical framework for the study.

The analysis and synthesis method were used to examine the major components of English linguistic competence, including phonological, lexical, morphological, and syntactic competence. Each component was analysed separately and then synthesized to explain their interrelationship within the process of foreign language learning in military higher education.

A systematic approach was adopted to investigate English linguistic competence as an integrated element of military language education. This approach made it possible to examine the relationships between linguistic competence, artificial intelligence, adaptive blended learning, CEFR-based learning outcomes, and profession-oriented English instruction within a unified educational system.

To evaluate the effectiveness of the proposed Artificial Intelligence–driven Adaptive Blended Learning methodology, a 26-week pedagogical experiment was conducted with 247 cadets from four military higher education institutions in the Republic of Uzbekistan. The participants were drawn from cadets with broadly comparable educational backgrounds and initial English proficiency levels. Participant selection was based on the following criteria: (1) enrolment in an English-language course within one of the participating military higher education institutions; (2) sufficient attendance to participate throughout the experimental period; (3) availability for both initial and final assessment; and (4) a broadly comparable initial level of English linguistic competence established through the diagnostic assessment. Cadets who could not participate consistently in the assessment and instructional stages were not included in the final analytical sample.

A total of 247 cadets participated in the final experiment, comprising 124 cadets in the experimental group and 123 cadets in the control group. The participants were not assigned solely according to institutional affiliation. After the initial diagnostic assessment, cadets with similar levels of English linguistic competence were considered for group formation. Before the intervention, the researchers also asked eligible cadets whether they were willing to participate in the experimental or control group.

This procedure was used to establish groups of comparable initial proficiency while taking participants' voluntary participation into consideration. The final distribution was 29 experimental and 30 control-group cadets at the Customs Institute, 31 and 30 at the Military Aviation Institute, 32 and 31 at the Ground Forces Institute, and 32 and 32 at the Public Safety University of the Republic of Uzbekistan.

The 26-week intervention was implemented throughout the experimental period. Before the intervention, both groups completed a needs-analysis questionnaire and a diagnostic assessment covering vocabulary, grammar, reading, listening, writing, and speaking. These procedures established the participants' initial level of English linguistic competence and identified areas requiring additional instructional support. The questionnaire particularly examined difficulties in language learning, the need for individualized guidance and feedback, and opportunities to use English in professional military contexts.

The experimental group received instruction through our blended learning methodology. The intervention integrated face-to-face classroom instruction, digital learning resources, individualized tasks, formative assessment, AI-supported feedback, authentic military English materials, and profession-oriented communicative activities. The learning process was organized so that classroom activities were complemented by digital and independent learning tasks. Cadets received additional practice according to their identified weaknesses and progress, while formative assessment was used to monitor development and determine subsequent learning needs.

Two AI-based tools were incorporated into the experimental learning process: ChatGPT and Google Gemini. They were used primarily as supplementary learning and feedback tools rather than as replacements for the teacher. Depending on the task, cadets used AI tools to obtain explanations of grammatical problems, practise vocabulary and military terminology, generate additional language exercises, receive feedback on written work, rehearse communicative situations, and obtain individualized recommendations for further practice. Teacher guidance and professional judgment remained an essential part of the instructional process.

Adaptation was based on several sources of learner information: initial diagnostic results, individual errors, formative assessment results, observed learning progress, self-reported difficulties, and military-professional language requirements. Accordingly, adaptation involved modifying the difficulty and type of learning tasks, selecting additional vocabulary and grammar practice, providing targeted reading and listening activities, and increasing opportunities for speaking and writing practice where particular weaknesses were identified. Individualization therefore operated together with blended learning rather than as a separate instructional procedure.

The control group continued to receive instruction through the conventional instructional practices used in the participating institutions. Unlike the experimental group, it did not receive the integrated HARBIY-AIBLEND sequence of individualized digital activities and AI-supported feedback. Both groups continued to study the required English content, but the experimental group received the additional adaptive, blended, and AI-supported instructional component.

At the end of the 26-week period, both groups completed the achievement assessment using the same assessment framework. Classroom observation, questionnaires, diagnostic and achievement tests, and expert evaluation were used as complementary sources of empirical evidence. The initial and final results were then compared to determine changes in the cadets' English linguistic competence and to examine differences between the experimental and control groups.

The experimental group therefore followed this actual sequence: Diagnostic assessment → identification of individual needs → classroom instruction → digital/independent practice → ChatGPT/Gemini-supported feedback → individualized tasks → formative assessment → adaptation of subsequent tasks → monitoring → final assessment.

Finally, a methodological analysis was carried out to evaluate existing approaches to English language instruction in military higher education. Based on the findings of

the theoretical and experimental stages of the research, practical recommendations were developed for integrating artificial intelligence into adaptive blended learning to improve the English linguistic competence of military cadets.

Statistical analysis

Descriptive statistics were used to summarize the distribution of cadets across the four achievement categories before and after the intervention. The experimental and control groups were compared at baseline and after the intervention. Inferential statistical tests should be selected according to the structure of the data and the assumptions of each test. Where applicable, statistical significance and effect sizes should be reported to evaluate the magnitude of the observed differences.

RESULTS

The empirical stage of the research was carried out to determine the initial level of English linguistic competence among cadets and to evaluate the effectiveness of the proposed Artificial Intelligence–driven Adaptive Blended Learning methodology. A total of 247 cadets from four military higher education institutions of the Republic of Uzbekistan participated in the pedagogical experiment. The participants were divided into an experimental group (124 cadets) and a control group (123 cadets). The distribution of respondents is presented in the following table (See Table 1):

Table 1. ***Distribution of participants in the pedagogical experiment***

No.	Military HEI	Experimental group	Control group	Total
1.	Customs Institute of the State Customs Committee of the Republic of Uzbekistan	29	30	59
2.	Military Aviation Institute, University of Military Security and Defence of the Republic of Uzbekistan	31	30	61
3.	Ground Forces Institute, University of Military Security and Defence of the Republic of Uzbekistan	32	31	63
4.	Public Safety University of the Republic of Uzbekistan	32	32	64
Total		124	123	247

Before implementing the proposed methodology, the participants completed a questionnaire designed to identify their perceptions of their English language proficiency and the difficulties they experienced while developing different language skills.

The analysis of the questionnaire results revealed that many cadets experienced difficulties in developing the major components of English linguistic competence. Listening and speaking were identified as the most challenging skills, while reading and writing also required additional instructional support. Many respondents indicated that they needed more individualized guidance, timely feedback, and greater opportunities to practise English in professional military contexts. These findings confirmed that conventional teaching approaches did not fully address the educational needs of

cadets and highlighted the necessity of introducing a more flexible and learner-centred instructional model.

Based on the results of the needs analysis, an Artificial Intelligence–driven Adaptive Blended Learning methodology was developed. The methodology integrates face-to-face instruction with adaptive digital learning technologies, artificial intelligence–supported personalized feedback, formative assessment, authentic military English tasks, and profession-oriented learning activities. Its design allows instructional content, learning pace, and assessment to be adjusted according to individual learner performance while maintaining alignment with CEFR learning outcomes and the professional requirements of military higher education.

Prior to the implementation of the proposed methodology, all 247 cadets completed a diagnostic placement test designed to establish their initial level of English linguistic competence. The assessment covered six areas: vocabulary, grammar, reading, listening, writing, and speaking. The test consisted of 100 points, 35 questions, with each skill contributing to the overall assessment. Vocabulary and grammar were assessed through objective items, while reading and listening were assessed through comprehension tasks. Writing and speaking were assessed through performance-based tasks related to general and military-professional communication.

The assessment was aligned with CEFR proficiency descriptors from A1 to B2, with the descriptors used to interpret learners' overall language performance. The resulting scores were converted into four achievement categories: Excellent, Good, Satisfactory, and Unsatisfactory. This categorization was used consistently in the pre-test and post-test to compare changes in the experimental and control groups.

Writing was assessed using an analytic rubric covering task achievement, organization and coherence, vocabulary range and accuracy, grammatical accuracy, and appropriateness of language use. Each criterion was rated on a five-point scale, with the total writing score converted to the 100-point assessment scale. Military-oriented writing tasks included activities such as preparing short reports, describing operational situations, and providing written instructions.

Speaking was evaluated through structured individual and paired tasks. The speaking rubric included task achievement, fluency, grammatical accuracy, vocabulary range, pronunciation, and interaction. Tasks were progressively adapted to the cadets' proficiency level and included describing situations, giving instructions, responding to questions, and discussing military-professional scenarios. The descriptors were aligned with CEFR performance expectations and incorporated military-context language where appropriate.

Expert evaluation was used as an additional source of evidence, particularly for productive language skills. Experts evaluated selected writing and speaking performances independently using the established assessment rubrics. Their evaluations considered linguistic accuracy, communicative effectiveness, professional appropriateness, and task completion. The expert scores were then compared with the results of the diagnostic and achievement assessments to support a more comprehensive evaluation of cadets' linguistic competence. The study therefore combined diagnostic

testing, achievement testing, questionnaires, classroom observation, and expert evaluation as complementary sources of empirical evidence.

The same assessment framework was applied at the beginning and end of the experimental period, allowing changes in the distribution of cadets across the four achievement levels to be examined. The aggregated results showed that the experimental group changed from 7.3% Excellent, 12.9% Good, 38.7% Satisfactory, and 41.1% Unsatisfactory before the intervention to 23.4%, 37.1%, 33.1%, and 6.5%, respectively, after the intervention. The baseline test results are presented in the following figure (See Figure 1):

Figure 1. ***Baseline diagnostic assessment results across English language skills***

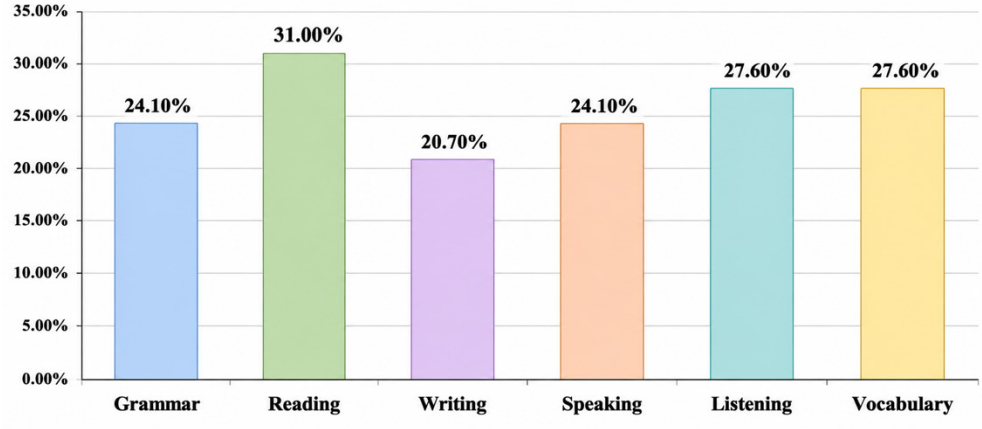


Figure 2 presents the results of the baseline diagnostic assessment of cadets' English language skills before the implementation of the proposed methodology. The percentages indicate the proportion of correct responses in the 35-item assessment across grammar, reading, writing, speaking, listening, and vocabulary. Higher percentages indicate a higher proportion of correct responses, whereas lower percentages identify areas in which cadets experienced greater difficulty.

The analysis of the questionnaire results revealed that many cadets experienced difficulties in developing the main English language skills. Most respondents indicated that they required additional guidance and continuous support, particularly in listening and speaking, while reading and writing also remained challenging for a considerable number of participants. The findings suggest that the existing instructional approach does not always provide sufficient opportunities for individualized learning, timely feedback, and systematic practice. Consequently, there is a clear need to introduce more flexible and learner-centred teaching methods capable of addressing the diverse learning needs of cadets.

Taking these findings into consideration, an Artificial Intelligence–driven Adaptive Blended Learning methodology was developed and refined to improve cadets' English linguistic competence. The proposed methodology integrates the principles of blended learning with artificial intelligence technologies that enable personalized learning pathways, adaptive assessment, continuous formative feedback,

and profession-oriented military English tasks. The instructional model also combines classroom teaching with digital learning resources and innovative educational tools specifically adapted to the professional requirements of military higher education. Such an approach allows instructors to respond more effectively to individual differences among learners while creating conditions for more active and autonomous language learning.

Before implementing the proposed methodology, a diagnostic placement test was administered to objectively determine the initial level of the cadets' English linguistic competence. The assessment measured their proficiency in vocabulary, grammar, reading, listening, and writing. Establishing the baseline level of language proficiency was necessary to ensure that the experimental and control groups were comparable before the pedagogical intervention. The results of the pre-test are presented in Tables 3, 4, 5, 6:

Table 3. ***Initial diagnostic test results of cadets' English linguistic competence at the Ground Forces Institute***

Language skill	**Experimental group**			**Control group**		
	Excellent n (%)	Good n (%)	Satisfactory n (%)	Excellent n (%)	Good n (%)	Satisfactory n (%)
Vocabulary	8 (27.6)	14 (48.3)	7 (24.1)	6 (20.7)	14 (48.3)	10 (34.5)
Grammar	7 (24.1)	15 (51.7)	7 (24.1)	5 (17.2)	15 (51.7)	10 (34.5)
Reading	9 (31.0)	13 (44.8)	7 (24.1)	7 (24.1)	13 (44.8)	10 (34.5)
Writing	6 (20.7)	16 (55.2)	7 (24.1)	4 (13.8)	15 (51.7)	11 (37.9)
Listening	8 (27.6)	15 (51.7)	6 (20.7)	6 (20.7)	14 (48.3)	10 (34.5)
Speaking	7 (24.1)	14 (48.3)	8 (27.6)	6 (20.7)	13 (44.8)	11 (37.9)
Average	**7 (25.9)**	**15 (50.0)**	**7 (24.1)**	**5 (19.5)**	**14 (48.3)**	**10 (35.6)**

Table 4. ***Initial diagnostic test results of cadets' English linguistic competence at the Military Aviation Institute***

Language skill	**Experimental group**			**Control group**		
	Excellent n (%)	Good n (%)	Satisfactory n (%)	Excellent n (%)	Good n (%)	Satisfactory n (%)
Vocabulary	9 (31.0)	15 (51.7)	7 (24.1)	7 (24.1)	13 (44.8)	10 (34.5)
Grammar	8 (27.6)	16 (55.2)	7 (24.1)	6 (20.7)	14 (48.3)	10 (34.5)
Reading	10 (34.5)	14 (48.3)	7 (24.1)	8 (27.6)	12 (41.4)	10 (34.5)
Writing	7 (24.1)	17 (58.6)	7 (24.1)	5 (17.2)	14 (48.3)	11 (37.9)
Listening	9 (31.0)	15 (51.7)	7 (24.1)	7 (24.1)	13 (44.8)	10 (34.5)
Speaking	8 (27.6)	15 (51.7)	8 (27.6)	6 (20.7)	13 (44.8)	11 (37.9)
Average	**8 (29.3)**	**15 (52.9)**	**7 (24.7)**	**6 (22.4)**	**13 (45.4)**	**10 (35.6)**

Table 5. ***Initial diagnostic test results of cadets' English linguistic competence at the Customs Institute***

Language skill	**Experimental group**			**Control group**		
	Excellent n (%)	Good n (%)	Satisfactory n (%)	Excellent n (%)	Good n (%)	Satisfactory n (%)
Vocabulary	10 (34.5)	15 (51.7)	7 (24.1)	8 (27.6)	13 (44.8)	10 (34.5)

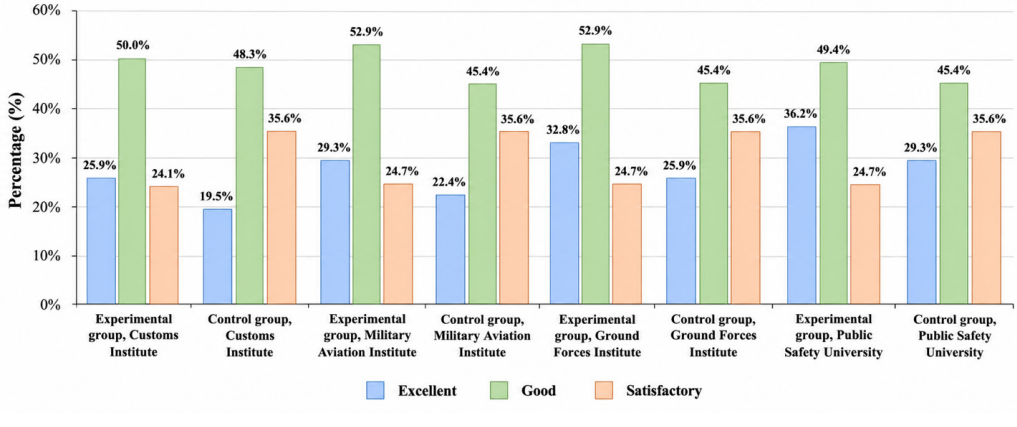
Grammar	9 (31.0)	16 (55.2)	7 (24.1)	7 (24.1)	14 (48.3)	10 (34.5)
Reading	11 (37.9)	14 (48.3)	7 (24.1)	9 (31.0)	12 (41.4)	10 (34.5)
Writing	8 (27.6)	17 (58.6)	7 (24.1)	6 (20.7)	14 (48.3)	11 (37.9)
Listening	10 (34.5)	15 (51.7)	7 (24.1)	8 (27.6)	13 (44.8)	10 (34.5)
Speaking	9 (31.0)	15 (51.7)	8 (27.6)	7 (24.1)	13 (44.8)	11 (37.9)
Average	**9 (32.8)**	**15 (52.9)**	**7 (24.7)**	**7 (25.9)**	**13 (45.4)**	**10 (35.6)**

Table 6. ***Initial diagnostic test results of cadets' English linguistic competence at the Public Safety University of the Republic of Uzbekistan***

Language skill	**Experimental group**			**Control group**		
	Excellent n (%)	Good n (%)	Satisfactory n (%)	Excellent n (%)	Good n (%)	Satisfactory n (%)
Vocabulary	11 (37.9)	14 (48.3)	7 (24.1)	9 (31.0)	13 (44.8)	10 (34.5)
Grammar	10 (34.5)	15 (51.7)	7 (24.1)	8 (27.6)	14 (48.3)	10 (34.5)
Reading	12 (41.4)	13 (44.8)	7 (24.1)	10 (34.5)	12 (41.4)	10 (34.5)
Writing	9 (31.0)	16 (55.2)	7 (24.1)	7 (24.1)	14 (48.3)	11 (37.9)
Listening	11 (37.9)	14 (48.3)	7 (24.1)	9 (31.0)	13 (44.8)	10 (34.5)
Speaking	10 (34.5)	14 (48.3)	8 (27.6)	8 (27.6)	13 (44.8)	11 (37.9)
Average	**10 (36.2)**	**14 (49.4)**	**7 (24.7)**	**8 (29.3)**	**13 (45.4)**	**10 (35.6)**

The following figure presents a graphical representation of the results of the initial assessment of the speaking skills of cadets at higher military educational institutions. During the first stage of the study, namely the diagnostic analysis, a total of 247 cadets from four higher military educational institutions in Uzbekistan participated in the initial English language proficiency assessment. The participants included 59 cadets from the Customs Institute of the State Customs Committee, 61 cadets from the Military Aviation Institute of the Military Security and Defense University of the Republic of Uzbekistan, 63 cadets from the Institute of Ground Forces of the Military Security and Defense University of the Republic of Uzbekistan, and 64 cadets from the University of Public Safety of the Republic of Uzbekistan (See Figure 2):

Figure 2. ***Initial test results of higher military educational institution cadets' English language proficiency assessment***



The aggregated results for all participating higher military educational institutions are presented in the following table (See Table 8):

Table 8. ***Comparative results of cadets' English language achievement before and after the experiment***

Assessment Stage	Group	Excellent (n)	Excellent (%)	Good (n)	Good (%)	Satisfactory (n)	Satisfactory (%)	Unsatisfactory (n)	Unsatisfactory (%)	Total (n)	Total (%)
Before the Experiment	EG	9	7.3	16	12.9	48	38.7	51	41.1	124	100
	CG	8	6.5	16	13.0	50	40.7	49	39.8	123	100
After the Experiment	EG	29	23.4	46	37.1	41	33.1	8	6.5	124	100
	CG	9	7.3	20	16.3	78	63.4	16	13.0	123	100
Difference	EG	+20	+16.1	+30	+24.2	−7	−5.6	−43	−34.6	0	0
	CG	+1	+0.8	+4	+3.3	+28	+22.7	−33	−26.8	0	0

Following the implementation of the Adaptive Blended Learning methodology, the distribution of achievement levels changed in both groups. In the experimental group, the proportion of cadets classified as "Excellent" increased from 7.3% to 23.4%, while the proportion classified as "Good" increased from 12.9% to 37.1%. The "Satisfactory" category decreased from 38.7% to 33.1%, and the "Unsatisfactory" category decreased from 41.1% to 6.5%. In the control group, the proportion classified as "Satisfactory" increased from 40.7% to 63.4%, while the "Unsatisfactory" category decreased from 39.8% to 13.0%. These descriptive findings indicate different patterns of change across the two groups. However, inferential statistical analysis is required to determine whether the observed differences are statistically significant.

DISCUSSION

The findings related to the first research question indicate that the cadets entered the study with different levels of English linguistic competence and specific learning needs. The baseline assessment showed that difficulties were evident across vocabulary, grammar, reading, listening, writing, and speaking, with listening and speaking identified as particularly challenging areas. The needs-analysis questionnaire also indicated that many cadets required more individualized guidance, timely feedback, and additional opportunities to use English in military-professional contexts. These findings suggest that a uniform instructional approach may not sufficiently address the different levels of preparation and learning needs of cadets. The diagnostic stage therefore provided an important basis for designing an instructional model in which learning activities could be adjusted according to individual performance and identified areas of difficulty.

With regard to the second research question, the findings indicate that the implementation of the Artificial Intelligence–driven Adaptive Blended Learning methodology was associated with noticeable improvement in the experimental group. Before the intervention, 7.3% of cadets in this group were classified at the "Excellent"

level and 12.9% at the "Good" level, while 41.1% were at the "Unsatisfactory" level. After the intervention, these figures changed to 23.4%, 37.1%, and 6.5%, respectively. The improvement was observed across vocabulary, grammar, reading, listening, speaking, and writing. This change may be related to the integrated nature of the methodology, which combined classroom instruction, digital learning resources, individualized tasks, formative assessment, AI-supported feedback, authentic military English materials, and continuous monitoring. Thus, the findings suggest that AI was most useful when incorporated into a broader pedagogical process rather than used as an independent instructional tool.

The third research question concerned differences between the experimental and control groups following the intervention. The final assessment showed that the experimental group achieved 30.4% "Excellent", 47.4% "Good", and 22.2% "Satisfactory" results across the assessed skills, compared with 23.3%, 43.8%, and 32.9% in the control group. The experimental group also demonstrated higher "Excellent" results in listening (30.6%), reading (33.9%), vocabulary (31.5%), grammar (29.0%), speaking (29.8%), and writing (27.4%). The statistical comparison using Pearson's two-sample criterion indicated more pronounced changes in the experimental group than in the control group. These results suggest that the integrated methodology was associated with greater development of English linguistic competence than the conventional instructional approach used by the control group.

Taken together, the findings provide a coherent answer to the three research questions. The first stage demonstrated the need for differentiated and professionally oriented English instruction; the second showed positive changes following implementation of the proposed methodology; and the third demonstrated different achievement patterns between the experimental and control groups. At the same time, the results should not be interpreted as evidence that artificial intelligence alone produced the observed changes, since the intervention consisted of several interconnected components, including blended instruction, individualized learning, formative assessment, AI-supported feedback, and monitoring. The study was also limited to 247 cadets from four military higher education institutions in Uzbekistan, and the reported analysis did not include long-term follow-up or detailed effect-size measures. Further research involving larger samples, longer intervention periods, and delayed post-tests would therefore be useful for examining the sustainability and broader applicability of the findings.

CONCLUSION

The findings of this study indicate that developing cadets' English linguistic competence in higher military education requires an integrated, learner-centered approach that combines language knowledge and skills with military-professional communication needs. The proposed Adaptive Blended Learning methodology integrates face-to-face instruction, digital learning resources, individualized tasks, continuous assessment, and AI-supported feedback to address cadets' learning needs and support their linguistic development. The comparative results showed more

substantial improvements in the experimental group than in the control group across the reported achievement categories. However, further statistical analysis is required to establish the significance of these differences. The practical value of the methodology lies in its potential to organize English language instruction in accordance with cadets' proficiency levels and professional requirements.

Further research should focus on refining AI-supported diagnostic and feedback mechanisms, improving assessment tools for military-professional linguistic competence, and examining the long-term effectiveness of Adaptive Blended Learning across larger samples, longer intervention periods, and different military specialties. Additional studies could also investigate communicative competence dimensions not directly examined in the present research. Overall, the findings support the continued development of systematic and evidence-based approaches to English language teaching in higher military education. Integrating phonological, morphological, lexical, and syntactic knowledge into professionally oriented learning activities may help strengthen cadets' language proficiency and communication skills. Nevertheless, claims concerning operational readiness and preparedness for international military cooperation require further investigation using specific performance indicators.

REFERENCES

1. Andreou, G., & Christani, P. (2025). The benefits and limitations of the use of generative artificial intelligence tools in the acquisition of productive skills in English as a foreign language—A systematic analysis. *Applied Sciences, 15*(21), Article 11476.
2. Bachman, L.F. (1990). *Fundamental considerations in language testing*. Oxford: Oxford University Press.
3. Bachman, L.F., & Palmer, A.S. (1996). *Language testing in practice*. Oxford: Oxford University Press.
4. Bonk, C.J., & Graham, C.R. (Eds.). (2006). *The handbook of blended learning: Global perspectives, local designs*. San Francisco: Pfeiffer.
5. Brown, H.D., & Lee, H. (2015). *Teaching by principles: An interactive approach to language pedagogy* (4th ed.). White Plains: Pearson.
6. Canale, M. (1983). From communicative competence to communicative language pedagogy. In J.C. Richards & R.W. Schmidt (Eds.), *Language and communication* (pp. 2–27). London: Longman.
7. Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics, 1*(1), 1–47.
8. Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
9. Chomsky, N. (1986). *Knowledge of language: Its nature, origin, and use*. New York, NY: Praeger.
10. Cong-Lem, N., Van Bui, C.N., Nguyen, N.P.N., & Huynh, M.Q. (2025). Bridging or breaking? A systematic review of how generative AI shapes equity in foreign language education. *International Journal of Applied Linguistics*, 1–12.
11. Council of Europe. (2001). *Common European framework of reference for languages: Learning, teaching, assessment*. Cambridge: Cambridge University Press.
12. Dudley-Evans, T., & St John, M.J. (1998). *Developments in English for specific purposes: A multi-disciplinary approach*. Cambridge: Cambridge University Press.
13. Ellis, R. (2015). *Understanding second language acquisition* (2nd ed.). Oxford: Oxford University Press.
14. Fulcher, G., & Davidson, F. (Eds.). (2012). *The Routledge handbook of language testing*. London: Routledge.

15. Garrison, D.R., & Vaughan, N.D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.
16. Halliday, M.A.K. (1973). *Explorations in the functions of language*. London: Edward Arnold.
17. Halliday, M.A.K. (1978). *Language as social semiotic: The social interpretation of language and meaning*. London: Edward Arnold.
18. Hamadneh, N.N., Atawneh, S., Khan, W.A. (2022). Using artificial intelligence to predict students' academic performance in blended learning. *Sustainability, 14*(18), Article 11642.
19. Hou, F., & Zhou, C. (2025). How AI shapes self-regulated learning in foreign language education. *Discover Computing, 28*, Article 344.
20. Hymes, D. (1972). On communicative competence. In J.B. Pride & J. Holmes (Eds.), *Sociolinguistics* (pp. 269–293). Harmondsworth: Penguin.
21. Hymes, D.H. (1974). *Foundations in sociolinguistics: An ethnographic approach*. Philadelphia: University of Pennsylvania Press.
22. Ji, H., Suo, L., & Chen, H. (2024). AI performance assessment in blended learning: Mechanisms and effects on students' continuous learning motivation. *Frontiers in Psychology, 15*, Article 1447680.
23. Kobicheva, A., & Baranova, T. (2024). Students' intention to learn and academic performance in the blended learning environment: The role of artificial intelligence chatbots. *International Journal of Information and Education Technology, 14*(6), 807–813.
24. Lee, S., Choe, H., Zou, D., & Jeon, J. (2026). Generative AI (GenAI) in the language classroom: A systematic review. *Interactive Learning Environments, 34*(1), 335–359.
25. Li, B., Tan, Y.L., Wang, C., & Lowell, V. (2025). Two years of innovation: A systematic review of empirical generative AI research in language learning and teaching. *Computers and Education: Artificial Intelligence, 9*, Article 100445.
26. Liu, J., Sihes, A.J.B., & Lu, Y. (2025). How do generative artificial intelligence (AI) tools and large language models (LLMs) influence language learners' critical thinking in EFL education? A systematic review. *Smart Learning Environments, 12*, Article 48.
27. Peng, Y., Wang, Y., & Hu, J. (2023). Examining ICT attitudes, use and support in blended learning settings for students' reading performance: Approaches of artificial intelligence and multilevel model. *Computers & Education, 203*, Article 104846.
28. Qu, M. (2025). Future of language learning: Unveiling the power of AI-driven adaptive platforms to tailor language learning based on learners' needs, proficiency and learning styles. *European Journal of Education, 60*(2), Article e70116.
29. Torres, P.J., & Kahveci, Y.E. (2025). Effectiveness of artificial intelligence (AI) in language teaching. *Computers and Education: Artificial Intelligence, 9*, Article 100522.
30. Uygun, E., & Demir, B. (2026). A PRISMA-based systematic review of artificial intelligence in English as a foreign and second language education (2023–2025). *Discover Education, 5*, Article 478.