

UDC 378.147:004.8:81'243

IRSTI 14.35.09

<https://doi.org/10.48371/PEDS.2026.82.3.005>

IMPACT OF ARTIFICIAL INTELLIGENCE INTEGRATION ON COMMUNICATIVE COMPETENCE FORMATION AND PERCEPTIONS OF NON-LINGUISTIC STUDENTS

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Abstract. The current study explores the effects of AI application on communicative competence of students pursuing other non-linguistic subjects at higher educational establishments. Nowadays, foreign language knowledge is viewed as an indispensable component of professional communication; yet, standard teaching approaches cannot effectively meet the requirements of those students enrolled in classes 119-26B and 119-28C owing to a lack of contact hours, heavy academic schedule, and low level of students' motivation.

The research is conducted by means of using both qualitative and quantitative research techniques in combination. Data of the quantitative kind were obtained by assessing the performance of the learners in terms of language proficiency, speaking, writing and vocabulary use, whereas qualitative data were acquired by applying open-ended surveys and interviews to the respondents. Undergraduates participating in the investigation were divided into two groups – experimental and control one. Students from the first group had an opportunity to receive training in AI, while those in the second group took traditional language courses. Based on the findings, it can be suggested that the application of artificial intelligence in the process of foreign language instruction brings about considerable progress in the learners' communicative competencies along with promoting students' autonomy and motivation. The results proved the hypothesis concerning the positive role played by artificial intelligence in developing profession-oriented communication and overcoming shortcomings of traditional language instruction.

Keywords: artificial intelligence, foreign language teaching, non-linguistic students, communicative competence, higher education, control group, communicative competence, traditional approaches

Introduction

The introduction of artificial intelligence (AI) in the process of education is seen as one of the main trends nowadays, and foreign language education, in particular, benefits greatly from innovations in technology. The ability to communicate with peers and colleagues from other countries is highly valued today, being perceived as an indispensable skill in various professional areas. However, existing methods and strategies of foreign language education cannot be fully used to develop such skills among non-linguistic specialists, since those are faced with numerous challenges in language learning processes.

Although the increasing use of artificial intelligence technologies in higher education takes place nowadays, little is known empirically about the role of such technologies in the development of communicative competence of students studying not linguistic subjects. Most of the available studies consider only the educational potential of AI tools or deal with the linguistic disciplines, while the question of how to experimentally prove the effect of these technologies on the development of communicative competence and attitudes of learners remains understudied. The present research seeks to fill in this gap and estimate the pedagogical efficiency of artificial intelligence-supported foreign language instruction through experimental research.

The aim of the present research is to find out how effective is the integration of artificial intelligence technologies into foreign language instruction for the formation of communicative competence of students studying non-linguistic subjects and how the students perceive the use of such technologies in the learning process.

In order to reach the aim of the study, the following research goals were defined:

- to study theoretically different approaches to the use of artificial intelligence in foreign language education;
- to create and apply the experimental model of AI-supported foreign language instruction for non-linguistic students;
- to compare the level of communicative competence of experimental and control groups before and after the pedagogical experiment;
- to estimate the effectiveness of the use of AI technologies in the development of communicative competence using both quantitative and qualitative research methods;
- to study the attitude of learners to AI tools in foreign language learning.

The following research hypothesis was formulated: the integration of artificial intelligence technologies into foreign language instruction significantly contributes to the development of communicative competence of students studying non-linguistic subjects and positively affects their motivation, learning autonomy, and attitudes toward language learning compared with the traditional instructional approaches. It becomes obvious that the integration of artificial intelligence in foreign language education has become the subject for active discussions among scholars in the last decade. Researchers emphasize that new technologies allow transforming traditional processes of language teaching and create new approaches to education that are adaptive and personalized [1]. Moreover, many authors pay much attention to non-linguistic learners because of the peculiarities of foreign language education of them.

In general, it is noted that non-linguistic learners experience certain difficulties while studying foreign languages because of low time for learning them, low motivation, etc. However, AI can help overcome the problems in question and provide learners with personalized training [2]. In particular, adaptive learning systems driven by artificial intelligence are capable of tailoring educational content based on proficiency level, speed of learning, and learners'

special requirements. It allows adapting foreign language instruction to meet particular needs of heterogeneous groups of students.

One of the most important directions discussed in relation to foreign language instruction for non-linguistic students is the use of conversational AI. It includes chatbots and other systems that are capable of simulating authentic conversations [3]. Using such tools, learners are able to practice communication in a foreign language in various scenarios. Moreover, since AI chatbots do not need time for reflection, they allow practicing communication more intensively, and it is especially useful for non-linguistic students [4].

Automated feedback tools have also become an interesting topic of discussion when dealing with foreign language education for non-linguistic students. It becomes clear that such technologies can make instruction more efficient due to the delivery of personalized responses immediately [5]. Automatic evaluation of writing skills, speech production, and pronunciation are highly important, but researchers argue that it is not enough and teachers' feedback is required [6]. Thus, automated tools cannot replace instructors, and they are to be combined.

There were some studies conducted recently focusing on pedagogical aspects of AI integration in foreign language education. It is emphasized that new technologies promote self-regulation and learner autonomy; however, there exist problems regarding overreliance on AI-based systems [7]. As far as non-linguistic learners are concerned, they cannot always monitor learning processes effectively because of insufficient metacognitive skills. Thus, guided use of AI technologies appears to be necessary. Instructors are viewed as facilitators of learning in modern digital environments [8].

While there is a rich set of publications devoted to AI in foreign language education, the gap in literature is found to be connected with a lack of systematic discussion of AI-based instruction for non-linguistic learners. There is an abundance of papers dedicated to general foreign language learning or language majors, and the needs of non-linguistic learners remain unaddressed. Thus, there is a necessity for conducting additional research aimed at analyzing successful models of AI-enhanced language education for non-linguistic students.

Materials and methods

The research was carried out based on a mixed-method approach which combines both quantitative and qualitative approaches. The choice of this approach is connected with the necessity to assess the effect of AI integration on students' communicative competence development and examine students' perception of artificial intelligence in foreign language learning.

The methodological framework of the study included the following scientific methods: pedagogical experiment, diagnostic examination, questionnaire survey, semi-structured interview, observation, comparative analysis, descriptive statistical analysis, and thematic analysis.

The study was based on the following research questions:

1. What effect does the integration of artificial intelligence tools have on

the formation of professional communicative competence among students of non-linguistic specialties?

2. How do students perceive the use of artificial intelligence tools in foreign language learning?

The participants were undergraduate students of non-linguistic specialties studying at one higher education institution. Students represented different academic areas such as technical, natural sciences, and social sciences. Foreign language learning was the mandatory part of the curricula but it was not the specialty of the students. Participants were divided into experimental and control groups (119-26B and 119-28C). Both groups had the same curriculum and learning objectives but only the experimental group used AI tools for learning.

At the first stage, the diagnostic placement test was conducted in order to check the students' foreign language proficiency level. This test was necessary to equalize the levels of the experimental and control groups. The test examined vocabulary, grammar, writing, and performing communicative tasks.

The pedagogical experiment lasted two weeks within the regular foreign language course. The control group learned the course material using traditional teaching aids which include coursebooks, professionally-oriented texts, and communicative tasks. The experimental group studied the same material but also AI-based tools were added to the learning process.

Conversational chatbots, automated writing feedback system, adaptive vocabulary and grammar exercises, and simulation of professional communication tasks were the AI tools which were chosen as they correspond to the aim of developing the communicative competence in professional and educational environments.

The efficiency of AI integration was measured by means of pre-test and post-test assessment. The pre-test was conducted before the experimental instruction and the post-test after it. The results of both groups were compared in order to reveal any changes in the students' communicative competence.

Quantitative data were collected using foreign language proficiency tests and task-based assessment of the communicative competence. It included the assessment of the speaking, writing, vocabulary usage, grammatical correctness, and the ability to perform professionally-oriented communicative tasks. The quantitative data were analyzed using descriptive statistical analysis and comparison of pre-test and post-test results.

Qualitative data were collected using the questionnaire and semi-structured interview. The questionnaire helped to find out students' attitude to the AI tools, their level of involvement, usefulness, and difficulties in the process of learning. The semi-structured interview allowed revealing the details of students' learning experience and the attitude to the use of AI in foreign language learning.

The qualitative data were analyzed using thematic analysis. The students' answers were grouped into the main themes which included the perceived usefulness of AI tools, motivation, improving communicative skills, difficulties in using the technology, and attitudes to the future application of AI in foreign language learning.

Thus, the research methodology included experimental, diagnostic, survey, interview, comparative and analytical methods.

Results and discussion

Statistically significant differences were found between two experimental groups; specifically, the experimental group performed better after receiving AI-enabled foreign language instruction, compared to the control one, which utilized only traditional educational approaches. Speaking performance of the learners in the former group was higher in terms of fluency and a richer vocabulary usage, along with increased self-confidence while talking to peers. The use of AI-powered conversation software allowed students to engage in communicative tasks without time limitations and worries about being assessed negatively. This effect is especially relevant to non-linguistic majors, because they often feel stressed when required to speak in class due to their limited contact with language.

As far as writing skills go, participants of the experimental group showed marked improvement regarding grammatical correctness, cohesiveness, and effective task completion. Writing evaluation tools enabled learners to receive prompt and personalized feedback, which helped them fix errors promptly. At the same time, the control group saw less noticeable improvements because of the lack of immediate personalized feedback from teachers.

According to surveys, learners in the experimental group had highly positive attitudes toward AI-assisted instruction. Most students felt that their motivation had increased and they gained more learner autonomy in their efforts to master foreign languages. Students in the experimental group noted that AI-powered learning allowed them to perform tasks independently and outside the confines of classwork, which is critical to non-linguistic majors who have other academic responsibilities.

It appears that our findings agree with previous empirical studies, which show how helpful AI technologies may be in the context of foreign language learning. Specifically, the improvements in communicative competence of non-linguistic students suggest that artificial intelligence may help overcome some limitations of traditional instruction in foreign languages.

Table 1. Features and Opportunities of Integrating Artificial Intelligence into Foreign Language Teaching for Non-Linguistic Students

Aspect	Traditional Foreign Language Teaching	AI-Enhanced Foreign Language Teaching
Learning focus	General language skills, limited professional orientation	Profession-oriented communicative competence aligned with students' major fields
Instructional approach	Teacher-centered, uniform instruction	Learner-centered, adaptive and personalized learning
Learning pace	Fixed pace for all students	Individualized pace based on learners' proficiency and needs
Speaking practice	Limited classroom interaction	Continuous practice through AI chatbots and speech simulators

Feedback	Delayed and mostly teacher-dependent	Immediate, automated, and individualized feedback
Learner autonomy	Low to moderate	High level of self-directed and autonomous learning
Motivation	Often low among non-linguistic students	Increased motivation through interactive and adaptive AI tools
Assessment	Traditional tests and teacher evaluation	AI-assisted formative and summative assessment
Accessibility	Limited to classroom hours	Available anytime and anywhere through digital platforms
Role of the teacher	Primary source of knowledge and feedback	Facilitator, coordinator, and pedagogical guide
Challenges	Limited time, large groups, lack of personalization	Ethical issues, risk of overreliance, need for digital literacy

Source: authors' own development.

Analysis of differences between conventional foreign language teaching and AI-enhanced education shows some trends and implies several pedagogical aspects worth mentioning.

Firstly, the introduction of AI allows significantly shifting the focus of training from generic language skills to profession-specific communicative competence. While traditional approaches tend to concentrate on grammar and vocabulary, tasks offered by means of AI can be adjusted in accordance with learners' professions. For non-linguistic students, this point plays a critical role since they learn languages mostly because of practical needs related to their career.

Secondly, AI-based training follows a learner-centered educational approach rather than traditional teacher-centered one. Adaptive learning systems and intelligent tutoring allow creating customized learning pathways for each student and adjusting the pace according to personal preferences. Thus, a major drawback of traditional methods is effectively eliminated, i.e., the issue of teaching heterogeneous groups of learners with various skill levels and different rates of acquisition.

Thirdly, AI technology helps increase speaking practice and make immediate feedback available. The lack of opportunity for constant classroom conversation due to time and number of participants limits traditional language education. However, using AI chatbots and simulation systems makes it possible to train constantly in a non-pressure atmosphere and receive instant feedback for making mistakes immediately.

Another important issue discussed concerns the influence of AI technology on learners' motivation and autonomy. Non-linguistic students have a tendency to lose interest in learning a foreign language because of its practical irrelevance or inefficient support from teachers [9]. In contrast, motivational elements offered by AI-based methods stimulate autonomy in the learning process.

Table 2. Pre-test and Post-test Results of Foreign Language Communicative Competence

Group	N	Test Stage	Speaking (Mean)	Writing (Mean)	Vocabulary (Mean)	Overall Score (Mean)
Experimental (119-26B)	60	Pre-test	63.4	65.1	62.8	63.8
		Post-test	78.6	80.2	79.1	79.3
Control (119-28C)	59	Pre-test	62.9	64.7	63.2	63.6
		Post-test	69.4	70.1	68.9	69.5

Source: authors' own development.

Conclusion based on the findings of this research:

- Improvement was observed for both classes after instruction.
- More noticeable improvement occurred in the experimental class in terms of communicative competence.
- Speaking and writing abilities improved the most due to assistance from AI.

Table 3. Student Questionnaire on AI-Supported Foreign Language Learning (Results)

Scale:1 – Strongly disagree | 2 – Disagree | 3 – Neutral | 4 – Agree | 5 – Strongly agree

Questionnaire Item	Experimental Group (Mean)	Control Group (Mean)
1. AI tools increased my motivation to learn a foreign language	4.3	3.1
2. AI-based activities helped me improve my speaking skills	4.5	3.2
3. Automated feedback helped me understand my mistakes better	4.6	3.4
4. AI-supported learning promoted learner autonomy	4.2	3.0
5. I felt less anxiety when practicing with AI tools	4.0	3.1
6. AI tools were easy to use and accessible	4.4	3.5
7. I would like AI tools to be used in future language courses	4.6	3.3

Source: authors' own development.

Table 4. Sample Questionnaire Items (Research Instrument)

Dimension	Sample Question
Motivation	<i>Did the use of AI tools increase your interest in learning a foreign language?</i>
Speaking Confidence	<i>Did chatbot-based speaking practice help you feel more confident in oral communication?</i>
Writing Skills	<i>Was automated feedback useful for improving your written tasks?</i>
Learner Autonomy	<i>Did AI tools allow you to study at your own pace and according to your needs?</i>
Anxiety Reduction	<i>Did practicing with AI tools reduce your fear of making mistakes?</i>
Perceived Effectiveness	<i>Do you consider AI-based instruction more effective than traditional methods?</i>

Source: authors' own development.

For the estimation of efficiency of the use of AI in foreign language instruction, pre- and post-test were used in order to evaluate proficiency in speaking, writing and vocabulary. Also, a questionnaire was carried out in order to estimate students' opinions regarding integration of AI tools in learning process. The results have proved that participants of the experimental group showed better results regarding communicative skills and had more positive attitude towards integration of AI than those from the control one.

However, the results have shown some problems which might arise while using artificial intelligence. Digital literacy, pedagogical methodology, and ethics are among those aspects which should be taken into account when using AI in education as reliance on technological means presupposes their appropriate use. Even though AI can be viewed as a supplement for teachers' activities, they should not rely completely on AI when teaching discourse competence, critical thinking, and professional communication.

To sum up, according to the analysis of the data obtained during the experiment, which corresponds to Table 1, there is an evident opportunity for improvement in terms of enhancing foreign language communicative competence by applying AI. The combination of personalized learning, profession-oriented tasks, constant practice, and immediate feedback makes AI-based learning more efficient and effective in comparison with usual lessons. At the same time, there are some limitations related to proper pedagogical application of artificial intelligence.

Specifically, significant progress in speaking skills corresponds to other studies that state that AI-based agents provide low-anxiety environment that is beneficial for producing language. Speaking, in general, is quite challenging even for language learners, but especially non-linguistic students who have another field as their major subject might need additional motivation to feel confident enough to speak in a foreign language.

Positive impact of AI-based writing tools correlates with other research as well and emphasizes that immediate feedback is crucial for development in language acquisition. At the same time, it is evident that pedagogical guidance plays a key role in using AI tools, since while it is possible to get accurate feedback through AI-based applications, it is necessary to pay attention to higher discourse functions.

Some difficulties have been detected regarding students' overreliance on technology and the problem with understanding the level of accuracy of automated feedback. It is important to integrate AI in language learning in a balanced and effective way, making it complementary but not exclusive. It is also vital to know the attitude of language teachers in Kazakhstan about artificial intelligence in education [10].

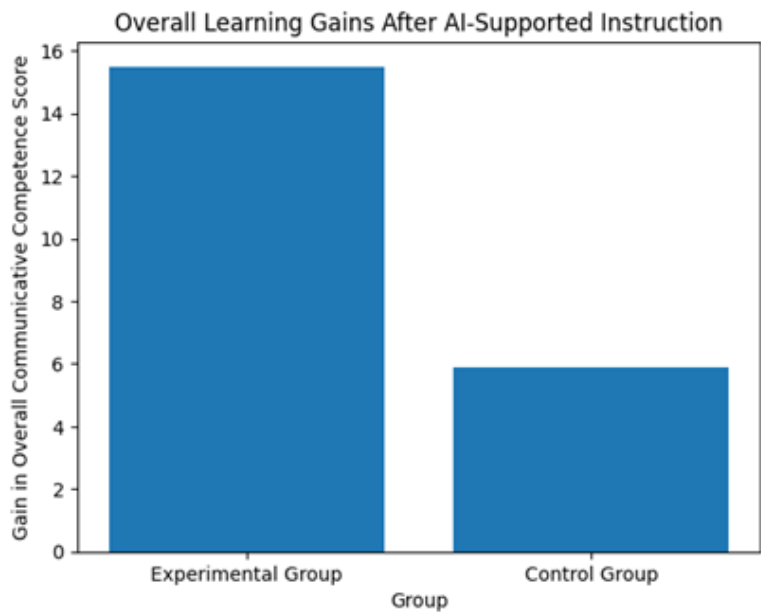


Figure 1- Figure 1. Learning Outcomes of AI-Supported vs. Traditional Foreign Language Instruction

Figure 1 shows total gains in communicative competence of foreign language in both groups. Both experimental and control groups demonstrate positive dynamics in the acquisition of knowledge; however, gains of the former group significantly exceed those of the latter group. This difference confirms the quantitative outcomes provided in Table 3 and supports the qualitative data presented in Table 4 regarding increased motivation, learner autonomy, and the efficiency of AI-enhanced teaching.

To conclude, the findings have proven that the introduction of artificial intelligence in the teaching process can create promising perspectives for enhancing foreign-language communicative competence in learners from non-linguistic specializations. The current discussion illustrates that, with the help of AI-based technologies, learner autonomy and motivation as well as professional communication can be fostered, keeping the key role of the teacher intact.

Conclusion

The current paper describes the main features and possibilities of the incorporation of artificial intelligence in foreign language education of non-linguistics specialists in the educational process. According to the obtained quantitative data, artificial intelligence significantly contributes to the enhancement of the level of the development of foreign language communicative competence. Thus, as can be seen from Table 1 and Figure 1 below, students in the experimental group showed significant improvement in the general level of communicative competence, which grew from 63.8 before the test to 79.3 after the experiment (gain = +15.5 points). At the same time, those in the control group

made smaller progress, their performance changing from 63.6 to 69.5 (gain = +5.9 points). Thus, learning gains in the AI-enhanced group exceeded the gains of those in the control one by 2.5 times.

A componential analysis demonstrates that the highest growths were shown in the areas of speaking (+15.2 points) and writing skills (+15.1 points), which went up to 78.6 and 80.2 correspondingly. This outcome proves the high efficiency of using such tools as conversational chatbots and automated writing systems in developing students' language skills.

Moreover, the obtained quantitative outcomes are confirmed by the results of the questionnaire conducted among the participants in the experimental group, whose answers regarding their attitude towards artificial intelligence in education are provided in Table 2. Students in the experimental group showed their positive attitude to the use of artificial intelligence in the learning process. They noted that it had significantly increased their motivation ($M = 4.3$), helped improve speaking skills ($M = 4.5$), helped to understand their mistakes ($M = 4.6$), and enhanced their learner autonomy ($M = 4.2$). Moreover, students admitted a lower level of anxiety while practicing foreign languages in the presence of artificial intelligence ($M = 4.0$), and also noted the high probability of applying it in the future classes ($M = 4.6$). The findings coincide with the results of a more detailed analysis performed by means of a separate questionnaire consisting of the questions described in Table 3, where motivation, confidence, autonomy, and effectiveness of integration are emphasized.

Thus, the findings prove that the usage of artificial intelligence is efficient for students studying in non-linguistic specialties, who are limited in terms of time and other priorities. Adaptive learning and the opportunity to develop productive skills outside class contributed to higher learners' motivation, confidence, and involvement in foreign language communication with the focus on their profession.

At the same time, it is important to state that despite the significant gains, it is important to consider the pedagogical aspects of using artificial intelligence, as otherwise the results can be misleading. In order to maximize the advantages, a purposeful approach must be applied, and artificial intelligence must be used only as an auxiliary tool to facilitate the teachers' work.

In addition, some limitations exist. First, the period of artificial intelligence application was not very long. Second, the sample of participants was not big enough. For these reasons, further studies might focus on longer periods of experimentation, cross-disciplinary analysis, etc. Nevertheless, integrated data in Tables 1-3 and Figure 1 show the high potential of using artificial intelligence in foreign language education for non-linguistics students.

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ЖАСАНДЫ ИНТЕЛЛЕКТТІ КІРІКТІРУДІҢ ТІЛДІК ЕМЕС МАМАНДЫҚТАР СТУДЕНТТЕРІНІҢ КОММУНИКАТИВТІК ҚҰЗЫРЕТТІЛІГІН ҚАЛЫПТАСТЫРУҒА ЖӘНЕ ОНЫ ҚАБЫЛДАУЫНА ӘСЕРІ

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Аңдатпа. Бұл зерттеу жоғары оқу орындарындағы тілдік емес мамандықтарда білім алатын студенттердің коммуникативтік құзыреттіліктеріне жасанды интеллектті қолданудың әсерін зерттеуге арналған. Қазіргі таңда шет тілін меңгеру кәсіби коммуникацияның ажырамас құрамдас бөлігі ретінде қарастырылады. Алайда оқу сағаттарының шектеулі болуы, жоғары академиялық жүктеме және студенттердің мотивация деңгейінің төмендігі себепті дәстүрлі оқыту тәсілдері 119-26В және 119-28С топтары студенттерінің қажеттіліктерін толық қанағаттандыра алмайды.

Зерттеуде сапалық және сандық әдістер кешенді түрде қолданылды. Сандық деректер студенттердің тілдік даярлығы, сөйлеу, жазу және сөздік қорды пайдалану дағдыларын бағалау арқылы алынды. Ал сапалық деректер ашық сұрақтардан тұратын сауалнамалар мен сұхбаттар негізінде жиналды.

Зерттеуге қатысқан студенттер эксперименттік және бақылау топтарына бөлінді. Эксперименттік топ студенттері жасанды интеллект технологияларын пайдалана отырып оқытылса, бақылау тобының студенттері шет тілін дәстүрлі оқыту әдістері арқылы меңгерді.

Зерттеу нәтижелері шет тілін оқыту үдерісінде жасанды интеллектті қолдану студенттердің коммуникативтік құзыреттіліктерінің едәуір дамуына, сондай-ақ олардың дербестігі мен оқу мотивациясының артуына ықпал ететінін көрсетті. Алынған нәтижелер жасанды интеллекттің кәсіби бағытталған коммуникацияны дамытудағы және дәстүрлі тілдік оқытудың кемшіліктерін еңсерудегі оң рөлін дәлелдеді.

Тірек сөздер: жасанды интеллект, шет тілін оқыту, тілдік емес мамандықтар, коммуникативтік құзыреттілік, жоғары білім, бақылау тобы, коммуникативтік құзыреттілік, дәстүрлі тәсілдер

ВЛИЯНИЕ ИНТЕГРАЦИИ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА НА ФОРМИРОВАНИЕ КОММУНИКАТИВНОЙ КОМПЕТЕНЦИИ И ВОСПРИЯТИЕ СТУДЕНТАМИ НЕЯЗЫКОВЫХ СПЕЦИАЛЬНОСТЕЙ

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Аннотация. Настоящее исследование посвящено изучению влияния использования искусственного интеллекта на формирование коммуникативных компетенций студентов неязыковых специальностей высших учебных заведений. В настоящее время владение иностранным языком рассматривается как неотъемлемый компонент профессиональной коммуникации, однако традиционные подходы к обучению не всегда способны эффективно удовлетворять потребности студентов групп 119-26В и 119-28С вследствие ограниченного количества учебных часов, высокой академической нагрузки и низкого уровня мотивации обучающихся.

В исследовании использовалось сочетание качественных и количественных методов. Количественные данные были получены посредством оценки уровня языковой подготовки студентов, их навыков говорения, письма и использования словарного запаса. Качественные данные собирались с помощью анкет с открытыми вопросами и интервью.

Участники исследования были разделены на две группы — экспериментальную и контрольную. Студенты экспериментальной группы проходили обучение с использованием технологий искусственного интеллекта, тогда как обучающиеся контрольной группы изучали

иностранный язык с применением традиционных методов обучения.

Полученные результаты позволяют предположить, что использование искусственного интеллекта в процессе обучения иностранному языку способствует существенному развитию коммуникативных компетенций студентов, а также повышению их самостоятельности и мотивации. Результаты подтвердили гипотезу о положительной роли искусственного интеллекта в развитии профессионально ориентированной коммуникации и преодолении недостатков традиционного языкового обучения.

Ключевые слова: искусственный интеллект, обучение иностранным языкам, неязыковые специальности, коммуникативная компетенция, высшее образование, контрольная группа, коммуникативная компетенция, традиционные подходы

Received / Мақала түсті / Стаття поступила: 29.01.2026

Accepted: / Жариялауға қабылданды / Принята к публикации: 25.09.2026

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