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INTERACTIVE LEARNING OF THE UKRAINIAN LANGUAGE AMONG STUDENTS USING AI-BASED CHATBOTS

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Abstract. The relevance of this study is driven by the growing need to integrate innovative digital tools, particularly artificial intelligence (AI)-based chatbots, into the educational process to enhance language learning efficiency and adapt to modern educational challenges. The work aimed to conduct a comprehensive evaluation of the effectiveness of integrating an AI chatbot into the process of learning the Ukrainian language, focusing on the development of language competencies and student motivation. The research was based on an experiment involving 96 students, divided into a control group (traditional methods) and an experimental group (using the chatbot). A mixed-method approach was employed: testing using the Attitude/Motivation Test Battery (AMTB), Natural Language Processing (NLP) metrics: BLEU (75%) and ROUGE-L (82%) to assess response quality, and in-depth analysis of interaction log files. Student's t-test was used for statistical data validation. The obtained results revealed a statistically significant advantage for the experimental group. Students in this group demonstrated higher response relevance (4.2 vs. 3.5 in the control group), as well as improved grammatical (76.4 vs. 62.3) and lexical competence scores (79.9 vs. 70.1). The motivation test also recorded substantial positive shifts: the average score for language interest was 4.5 (vs. 3.8), while the anxiety level significantly decreased to 2.0 (vs. 2.7). The scientific novelty of the research lies in the development and testing of a specialized AI-based chatbot for learning the Ukrainian language, built on a transformer architecture and the implementation of an integrated assessment approach that simultaneously encompasses technological efficiency (through NLP metrics and log-file analysis) and pedagogical-psychological impact (on motivation and anxiety). The results confirm that the integration of AI chatbots is an effective tool for enhancing motivation, academic achievement, language skills development, and anxiety reduction. Prospects for further research include analyzing the long-term impact and adapting the methodology to other disciplines and cultural contexts.

Keywords*:* natural language processing, machine learning, higher education, language competence, interactive learning, chatbots, artificial intelligence.

1. INTRODUCTION

The dynamic development of artificial intelligence (AI) technologies and their integration into the educational paradigm underscore the relevance of this study. The advancement of technologies such as natural language processing (NLP) and machine learning (ML) opens new prospects for personalizing the educational process. The implementation of NLP-based chatbots facilitates real-time interactive interaction (Valyukevych et al., 2021). This simplifies the assimilation of complex educational material and increases student engagement (Zhylin et al., 2022). Simultaneously, ML applications enable the analysis of educational data and the prediction of user behavior, optimizing learning programs.

AI technologies are rapidly penetrating the field of education, offering new solutions for optimizing the learning process (Huang et al., 2023). One promising tool is chatbots based on NLP and ML algorithms, which create an interactive, personalized learning environment for students (Zou et al., 2023). These chatbots provide quick access to educational resources, automate routine tasks, and maintain continuous dialogue between students and the system. However, technical challenges such as query recognition accuracy, response quality, processing speed, and the ability to adapt to users' knowledge levels remain key concerns.

Automated conversational systems serve as multifunctional tools that facilitate language learning and the development of intercultural communication in the global educational space (Shytyk & Akimova, 2020). Their application ensures effective adaptation to various linguistic, cultural, and educational contexts. By integrating modern technologies, they contribute to the personalization of the learning process and the formation of competencies necessary for successful integration into international academic and professional communities (Klochan et al., 2021).

This study analyzes the effectiveness of chatbot integration in the process of learning the Ukrainian language, focusing on their impact on student motivation, language skills development, and the system's technical characteristics. The research problem lies in determining the impact of these technologies on student motivation, language skill development, and the optimization of the system's technical aspects. The study is distinguished by its novel approach, integrating the analysis of chatbot technical performance with pedagogical assessments of their influence on motivation and language skills. Unlike other studies that predominantly focus on either technical or educational aspects, this research examines the synergistic effect of both components, offering a deeper understanding of the effectiveness of chatbot usage in learning.

The study aims to analyze the efficiency of AI-based chatbot integration in Ukrainian language learning, considering motivation enhancement and language competency development. To achieve this goal, the following research objectives are addressed:

1. Examine the technical aspects of AI application in education and chatbot integration into the learning process.
2. Analyze the impact of chatbots on the formation of students' learning motivation.
3. Investigate the influence of chatbot usage on students' language skill development.

This study aims to fill a significant gap in the literature by providing a dual-perspective, empirical evaluation of an AI chatbot's impact on Ukrainian language learning. Unlike previous works that often focus solely on either technical performance or pedagogical outcomes, our research integrates rigorous NLP metrics with validated psychometric instruments (AMTB) to offer a more holistic understanding of how chatbot integration affects both language competency and learner motivation within a specific linguistic context.

2. LITERATURE REVIEW

Examining the theoretical foundations of using AI-powered chatbots in teaching the Ukrainian language enables the integration of modern learning approaches and a critical assessment of their effectiveness. Analyzing key concepts reveals both the potential of innovative technologies and their limitations. According to the study by Nikolashyna et al. (2024), combining traditional methods with chatbots ensures deeper material comprehension, as the teacher acts as a moderator who stimulates the development of critical thinking. In turn, Nedashkivska et al. (2023) emphasize the possibility of personalized learning, which enhances students' autonomy and communication skills. Both studies confirm the significant positive impact of interactive technologies; however, they do not provide a detailed analysis of the technical limitations of implementing such solutions.

Some authors focus on the effectiveness of chatbots in the communicative approach. Nisha (2024) highlights that the authenticity of speech situations modeled using chatbots contributes to the

development of communicative competence. Xia et al. (2024) point to interactive tasks as an effective tool for stimulating speech skills and idea exchange. However, Musayeva (2024) stresses the necessity of incorporating cultural context, allowing students to understand the sociocultural features of the language. These approaches are important for improving contemporary philological education but leave open the question of optimizing cultural integration in chatbots.

Additionally, the motivational aspect of using chatbots has also been a subject of discussion. Zhang et al. (2024) argue that the interactivity and autonomy provided by chatbots support students' intrinsic motivation. Yin et al. (2024) emphasize the adaptability of such technologies, which contributes to individualized learning and improved academic performance. Huang et al. (2022) draw attention to gamification, which stimulates extrinsic motivation; however, they believe that this approach may lead to dependency on external stimuli. Thus, while the motivational potential of chatbots is undeniable, possible drawbacks related to technology dependency should be considered.

On the other hand, Shi & Tsai (2024) note that natural language processing (NLP) improves the quality of dialogues with chatbots, but limitations related to language complexity may reduce their effectiveness. Li (2024) stresses that the application of machine learning (ML) algorithms raises ethical concerns, particularly regarding data usage. Although these challenges do not diminish the value of AI technologies, they indicate the need for a more comprehensive approach to their development and integration. Therefore, analyzing recent studies allows for balancing advantages and limitations, ensuring more effective use of chatbots in Ukrainian language learning.

As demonstrated in the proposed review, the current study justifies its relevance by the presence of gaps in researching AI technology implementation in education. Despite numerous studies, the effectiveness of chatbot-based personalized learning remains underexplored. This article fills this gap by analyzing the impact of technologies, particularly NLP, on adapting methodologies to students' needs and their potential for improving academic outcomes. However, for a deeper understanding, further research is needed, particularly focusing on the long-term impact of interactive technologies on students' language skills. It is essential to expand the analysis of cultural adaptation and the contextual use of chatbots in different linguistic and cultural environments. Future steps should concentrate on improving NLP technologies to enhance the accuracy and efficiency of user communication.

3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

The study was conducted in three consecutive stages. The research structure allowed for an assessment not only of the technical efficiency of chatbots but also of their impact on students' motivation and language skill development. The stages of the study and their content are illustrated in Figure 1.

The study involved students of two higher education institutions: the Interregional Academy of Personnel Management and the Department of General Linguistics and Slavic Languages at Ternopil Volodymyr Hnatyuk National Pedagogical University. The sample included first- and second-year students from the Department of Information Technologies, who were studying the course “Ukrainian Language for Professional Purposes.” The study involved a comparison between a control group (CG) and an experimental group (EG). In the CG, students used traditional learning methods, whereas in the EG, they used chatbots. A mixed-method approach was applied, combining quantitative analysis of logs and test results with qualitative collection of student feedback. To ensure statistical significance, the sample size was 96 respondents, with 50 students in the EG and 46 in the CG. Participants in the EG studied the Ukrainian language using an AI-based chatbot, while CG participants followed the standard curriculum. Inclusion criteria consisted of university students taking Ukrainian as a mandatory course and possessing basic digital skills. Additional selection criteria included participation in prior pilot tests of the chatbot and a low level of technical proficiency. Student participation was essential for examining real-world conditions for chatbot integration into the learning process. The selected participants

represented a typical audience learning Ukrainian and had access to the necessary technology for effective chatbot use. The sampling method used was blind random selection. Ten faculty members from the Faculty of Letters at Ataturk University were invited as experts. All participants provided informed consent for participation and data processing.

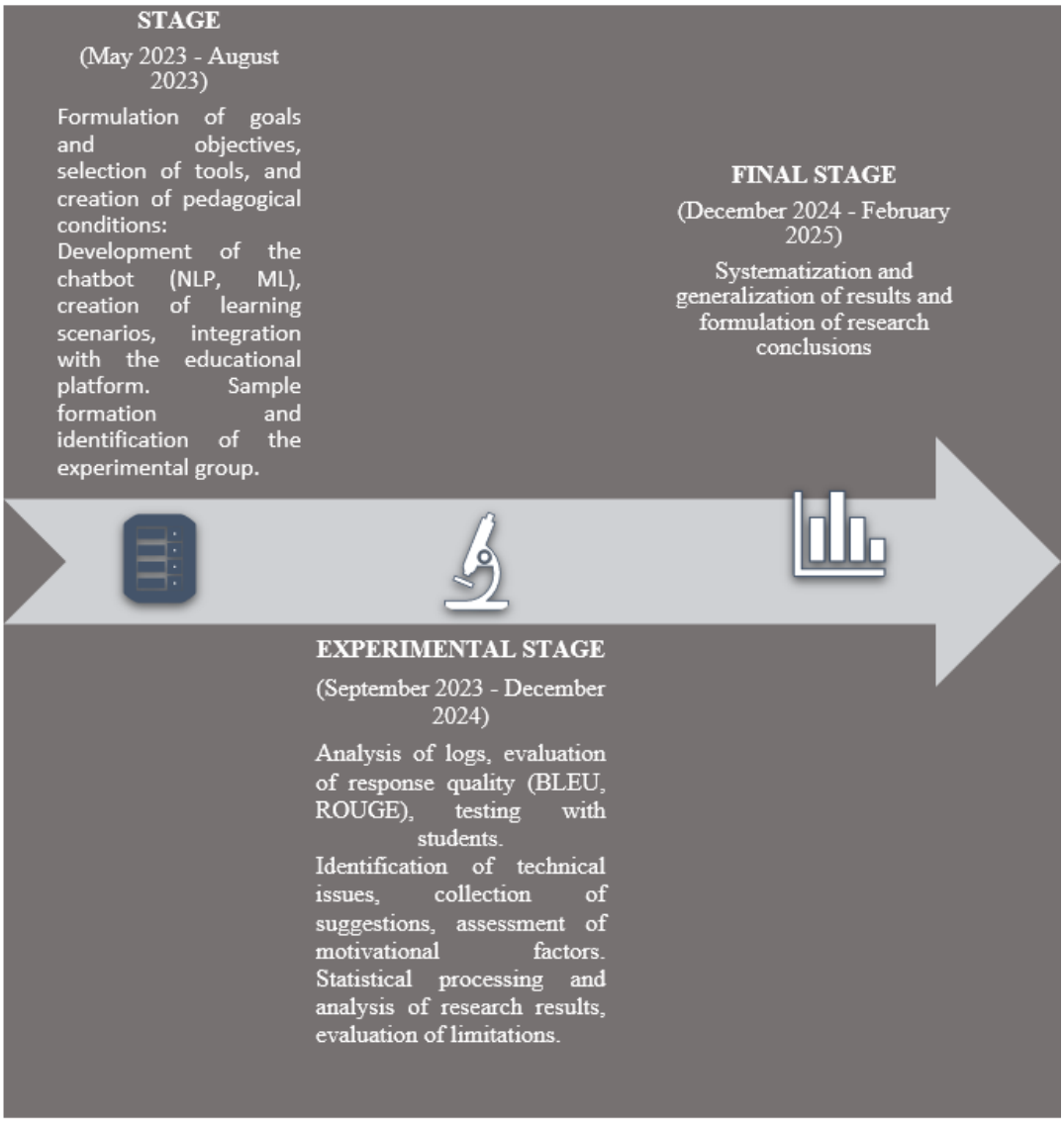

Fig. 1. Stages of the study

Source: developed by the authors based on research results

As an experimental model, a chatbot was developed based on a transformer architecture using the Transformers library from Hugging Face. This architecture ensures high-quality natural language processing and response generation. Machine learning algorithms, such as clustering and recommendation systems, were used for personalized learning. The chatbot was integrated into WhatsApp via an appropriate API.

Data collection:

1. Analysis of chatbot log files allowed for an assessment of the efficiency of query recognition and processing algorithms (Lord et al., 2024). A log file is a record of user interactions with the system, containing queries, responses, and technical information. In this study, this method was used to identify errors in query interpretation for subsequent algorithmic corrections. The collected data also contributed to optimizing dialogue structures and improving response accuracy.

2. To assess the relevance and accuracy of chatbot-generated responses, natural language processing

(NLP) metrics such as BLEU and ROUGE were applied. BLEU measures response accuracy by comparing n-grams in chatbot responses with reference texts, while ROUGE evaluates lexical completeness by analyzing overlap between generated responses and reference texts. These metrics were used to objectively measure text generation quality based on linguistic parameters, aiding in algorithm refinement and ensuring didactic alignment (Hossain & Goyal, 2024).

3. The study employed the Attitude/Motivation Test Battery (AMTB) to determine students' level of engagement and interest. The test results were used to evaluate the affective and cognitive aspects of chatbot interaction. This method enabled an assessment of the pedagogical condition – the use of chatbots – and its psychological impact on participants (Gardner, 1985). AMTB was used to assess students' motivation and attitudes. The original scale was translated into Ukrainian following a standard forward-backward translation procedure by two bilingual linguists to ensure conceptual and linguistic equivalence. The internal consistency reliability of the adapted Ukrainian AMTB subscales in our sample was assessed using Cronbach's alpha. The obtained values ranged from 0.75 to 0.89, all exceeding the accepted threshold of 0.7, thus confirming the instrument's good reliability for this study.

In this study, 'response accuracy' was operationally defined as the percentage of the chatbot's responses that were deemed semantically correct, grammatically sound, and directly addressing the user's query, as evaluated by two independent linguistic experts against a set of pre-defined ideal answers.

A comprehensive set of statistical methods was employed in the study to ensure a thorough evaluation of the automated system's effectiveness. The mean value was used to assess the typical level of indicators among participants, while standard deviation (SD) helped determine the degree of variability, which is crucial for analyzing data heterogeneity. The range of values provided an overview of the full spread of results, highlighting extreme scores. Student's t-test was applied to verify the statistical significance of differences between groups, which is key for evaluating the methodology's effectiveness. This combination of methods is optimal for a quantitative study involving two groups, ensuring accuracy and validity of the conclusions.

4. RESULTS AND DISCUSSION

To determine the impact of the chatbot on the learning process and its potential for improvement, an analysis of log files was conducted. This method allowed for an assessment of the chatbot's effectiveness in recognizing and processing student queries. The study examined response accuracy, query complexity, error frequency, and user interaction. The research findings are presented in Table 1.

Tab. 1

Chatbot Log File Analysis

Parameter	Mean	SD	Range	t-value ($p < 0.05$)
Response accuracy (%)	85.4	8.3	67–96	4.12
Repeat query frequency (%)	12.7	4.5	5–22	3.21
Session duration (min.)	14.8	3.2	9–22	2.87
Queries per session	8.3	1.6	5–11	3.45
Test scores (points)	78.6	6.2	65–90	5.02
System error frequency (%)	7.8	3.1	2–15	3.88
Query type (%):	38	-	-	-
Grammar	38			
Lexicon	35	-	-	-
Communication	27	-	-	-
Query complexity level (1–5 scale)	3.2	0.8	2–5	2.73
Bot response time (s)	2.7	0.5	1.8–3.5	2.95

Number of interaction sessions	11.4	3.9	6–18	3.01

Source: developed by the authors based on research findings

The analysis results demonstrated a high level of response relevance with a low frequency of repeated queries, indicating the efficiency of the query interpretation algorithms. The session duration and number of queries suggest active user interaction with the system. The knowledge assessment results confirm the positive impact of the system on academic performance. The low frequency of system errors indicates the stability of the algorithmic framework. The collected data confirm the effectiveness of the system for developing language competencies and enhancing user motivation.

The next step involved applying BLEU and ROUGE-L metrics to evaluate the accuracy and relevance of the chatbot's responses to student queries. These metrics allow for an assessment of the quality of generated text compared to reference answers. The results are presented in Table 2.

Tab. 2

Chatbot Performance Analysis Using BLEU and ROUGE-L Metrics

Indicator	Mean (%)	SD (%)	Range (%)
BLEU	75	8	60–90
ROUGE-L	82	7	65–95
Complexity Level	68	10	50–85
Error Frequency	12	5	5–20

Source: developed by the authors based on research findings

The analysis results demonstrate the system's effectiveness in supporting Ukrainian language learning. The high BLEU and ROUGE-L scores indicate the accuracy and relevance of generated responses. The low error frequency confirms the system's stability in processing queries of moderate complexity. The standard deviations suggest consistency in results across interaction sessions. The collected data confirm the potential of automated systems for developing language competencies and supporting individualized learning.

Further, the AMTB test was used to assess the impact of chatbot use on motivational aspects of foreign language learning. This test measures interest in learning, motivation level, attitudes toward native speakers, anxiety, and willingness to study the language – key variables in the study's context. The values before and after the experiment are presented in Figure 2.

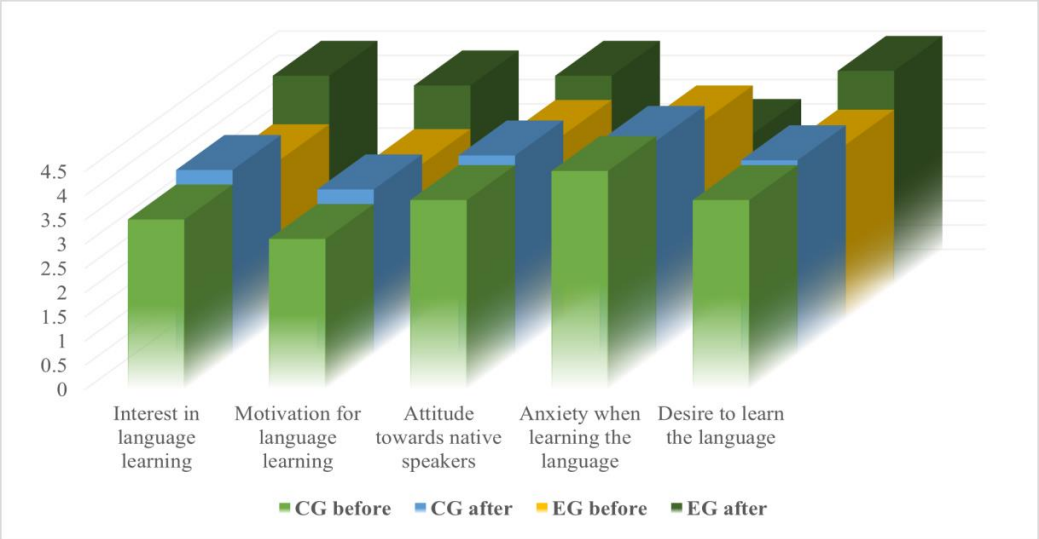

Fig. 2. Dynamics Of Motivational Aspects in Foreign Language Learning Among CG And EG Students Before and After the Experiment

Source: developed by the authors based on research results

Data analysis demonstrates that the indicators in the EG increased significantly more after the intervention than in the CG, indicating a positive impact of the methodology. Specifically, interest in language learning in the EG increased from 3.3 to 4.3, while in the CG it rose only from 3.5 to 3.8. Motivation for language learning also increased significantly in the EG compared to the CG. Anxiety related to language learning significantly decreased in the EG, while it remained almost unchanged in the CG. These results confirm the effectiveness of the applied approach in the EG. The primary goal of the method was to determine whether the integration of chatbots contributes to improving these indicators among students compared to traditional teaching methods. The results are presented in Table 3.

Tab. 3

AMTB Test Results for CG and EG Students

AMTB Variable	Group	Mean	SD	t-value	p-value	Effect Size (Cohen's d)	95% CI for Mean Difference
Interest in language learning	CG	3.5	0.8				
	EG	4.2	0.6	2.85	0.006	0.89	[0.21, 1.19]
Motivation for language learning	CG	3.8	0.7				
	EG	4.5	0.5	3.12	0.002	1.02	[0.25, 1.15]
Attitude towards native speakers	CG	3.9	0.9				
	EG	4.6	0.7	2.68	0.009	0.78	[0.18, 1.22]
Anxiety in language learning	CG	2.7	1.0				
	EG	2.0	0.8	-2.45	0.016	-0.71	[-1.28, -0.12]
Desire to learn the language	CG	3.6	0.8				
	EG	4.3	0.6	2.97	0.004	0.93	[0.23, 1.17]

Note: CG = Control Group (n=46), EG = Experimental Group (n=50). All tests are two-tailed independent samples t-tests. Effect size (Cohen's d) is interpreted as small (0.2), medium (0.5), and large (0.8). CI = Confidence Interval. – $p < 0.05$ (statistically significant differences). ** – $p < 0.01$ (highly statistically significant differences)*

Source: developed by the authors based on research results

The test results indicate a higher level of interest, motivation, and a more positive attitude toward native speakers in the group using chatbots (EG) compared to the conventional group (CG). The lower level of language learning anxiety in the EG confirms the reduction of stress factors in the learning process. The significance of the differences was confirmed by the t-test, demonstrating the statistical reliability of the obtained results. These findings indicate that integrating chatbots into the educational process can significantly improve motivational indicators and overall foreign language learning effectiveness. As a visual conclusion, a visualization of the differences in foreign language competence formation using traditional methods versus chatbots was created based on the results of all three studies (Figure 3).

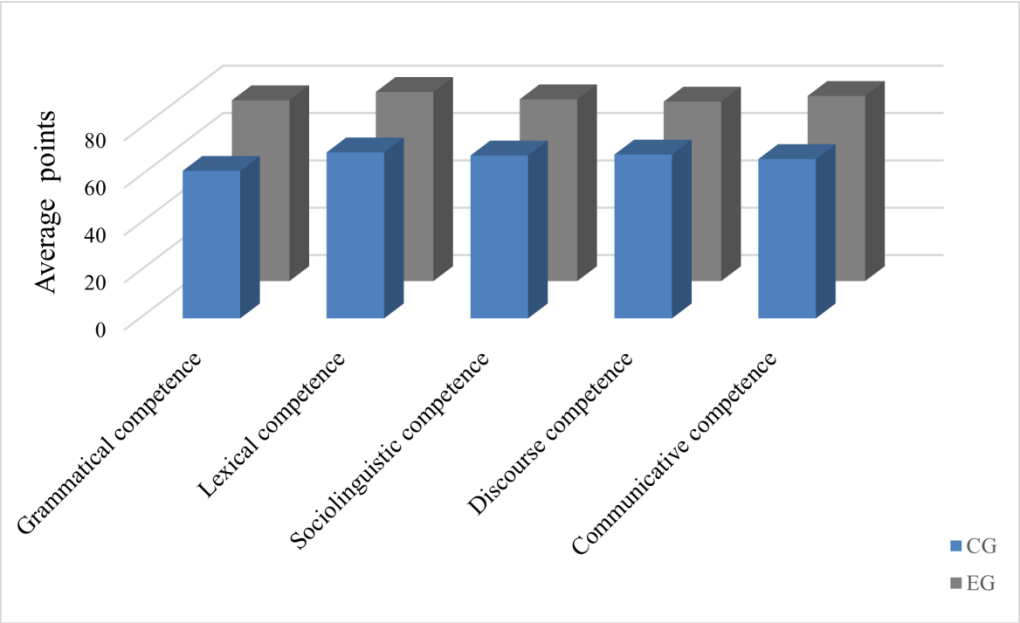

Fig. 3. Final Assessment Of Foreign Language Competence Formation Using Traditional Methods Versus The AI Chatbot

Source: developed by the authors based on research results

The study demonstrates that the use of chatbots (EG) statistically significantly improves all components of students' foreign language competence compared to the traditional method (CG). Higher mean values in EG and significant t-tests confirm the effectiveness of integrating chatbots into the learning process. The data indicate the potential of chatbots for enhancing language education quality. In particular, grammatical competence in EG reaches 76.4 versus 62.3 in CG ($p<0.05$). Lexical competence also shows a statistically significant advantage in EG –79.9 compared to 70.1 in CG ($p<0.01$). Similar results are observed in other categories, confirming the effectiveness of innovative approaches in education.

A twofold contribution is made to the field of AI in education. First, context-specific evidence is provided for the effectiveness of transformer-based chatbots in learning Ukrainian, a language with unique morphological and syntactic challenges that are underrepresented in mainstream NLP research. Second, a causal link is demonstrated between the use of a well-defined chatbot system and significant improvements in key affective factors, namely increased motivation and reduced anxiety, which are critical for sustainable language acquisition.

The obtained results demonstrate a statistically significant advantage of using automated systems in language learning, reflected in increased motivation, engagement, and reduced user anxiety levels. Statistically significant differences between EG and CG confirm the effectiveness of automated systems for interactive learning. They highlight the potential for integrating modern technologies into education to develop language competencies.

The study of the technical aspects of AI technology implementation in education is, in the authors' opinion, a crucial step toward integrating innovations into the learning process. On the one hand, scientific discourse suggests the significant potential of such technologies. For example, Ng et al. (2024) state that AI can automate feedback processes, making learning more adaptive and efficient. Similarly, Bettayeb et al. (2024) argue that chatbot integration enhances student engagement and ensures personalized learning. On the other hand, some researchers point out risks and limitations associated with AI use. According to Selwyn (2024), AI in education might lead to a decline in learning quality due to excessive automation and the loss of individualized approaches. Additionally, Williamson (2024) emphasizes that inadequate technical infrastructure and teacher training can create further barriers to AI adoption. While these critical perspectives are valid, we believe they should serve as motivation for

improving technology and teacher preparation. We take a constructive stance on such critiques, aiming to minimize shortcomings and ensure the effective use of AI in education.

An analysis of chatbots' influence on students' learning motivation has shown that motivation is a key factor in successful learning. Advocates of chatbot integration highlight their ability to increase student engagement and foster interactivity. For instance, (Shymkiv & Kostikov,2023) state that chatbots promote student involvement through continuous dialogue and an adaptive learning approach. Aleksandrov (2024) similarly emphasizes that chatbots create a supportive environment that encourages a positive attitude toward learning. However, there are critical viewpoints as well. According to (Pavlenko & Syzenko,2024), chatbot integration might lead to student dependence on technology, reducing their autonomy. Moreover, Schiff (2022) and Sari (2023) argue that the lack of emotional engagement in chatbot interactions may negatively affect intrinsic motivation, as students might miss the "human factor." Despite these concerns, we view such critiques as an opportunity to improve existing technologies. Integrating elements of emotional intelligence into chatbot algorithms and balancing AI use with traditional teaching methods could serve as effective strategies to mitigate these drawbacks.

Research on the impact of chatbots on students' language skills suggests that these technologies are increasingly being integrated into the learning process. Proponents of education digitalization argue that chatbots enhance language skills through real-time practice and feedback. For example, Baidoo-Anu & Owusu Ansah (2023) assert that chatbot interactions boost students' confidence in spoken language, as they can experiment without fear of mistakes. Chan (2023) adds that chatbots create an environment that simulates real communication, allowing students to improve grammar, vocabulary, and pronunciation. Critics, however, question chatbots' ability to replace traditional language learning methods. For instance, Edmett et al. (2023) note that chatbots have limitations in understanding cultural contexts and nonverbal communication, which are essential for language acquisition. Similarly, Kayali, et al. (2023) argue that chatbot responses may be overly simplistic or formulaic, hindering the development of creative thinking in communication. We acknowledge these critical perspectives, emphasizing the importance of combining AI technologies with traditional teaching methods to compensate for chatbots' limitations. Enhancing chatbots' adaptability to context and incorporating cultural nuances, in our view, can improve their effectiveness in language learning.

Practical Implications. The study confirmed the effectiveness of chatbots in language learning, as they enhance student motivation and improve language skills. The results demonstrated higher achievements among students using chatbots compared to those following traditional learning methods. These findings open new possibilities for integrating chatbots into language learning programs as a supplement to conventional methods.

Theoretical Implications. Additionally, this study expands knowledge about AI's impact on education, particularly in motivation and language skill development. It confirms the importance of adaptive technologies in modern education, laying the groundwork for further research in pedagogy and psychology.

The obtained results can be used to develop interactive learning platforms with integrated automated dialogue systems that personalize the learning process based on users' competence levels. Integrating such systems into Ukrainian language teaching can enhance user motivation, develop their communicative competence, and reduce anxiety levels. Furthermore, automated dialogue systems can optimize teachers' routine tasks, freeing up time for creative and analytical work.

Limitations. The study has certain limitations that should be taken into account when interpreting the results. First, the limited number of participants may affect the ability to generalize the obtained data to a wider population. Second, the use of only one type of automated system does not allow for the evaluation of the potential of different architectures or functional capabilities. Third, the limited period of the study did not allow for the assessment of long-term effects of the automated system. Furthermore, the influence of subjective factors, such as participants' prior experience, on the testing results cannot be

ruled out.

5. CONCLUSIONS

The findings of this study provide compelling evidence for the effectiveness of AI-based chatbot integration in Ukrainian language education. The comprehensive analysis of both technical performance and pedagogical impact reveals several key advantages of this innovative approach.

The chatbot demonstrated strong technical performance, achieving a BLEU score of 75% and ROUGE-L score of 82%, indicating high-quality text generation capabilities. System reliability was confirmed through low error frequency (12%) and rapid response times (2.7 seconds on average), while user engagement metrics showed active participation with 8.3 queries per session lasting approximately 14.8 minutes.

Most significantly, the experimental group using the chatbot showed substantial improvements across all measured motivational dimensions compared to the control group. As detailed in Table 3, the EG exhibited significantly higher interest in language learning (mean 4.2 vs 3.5, $p=0.006$, $d=0.89$), stronger motivation (mean 4.5 vs 3.8, $p=0.002$, $d=1.02$), more positive attitudes toward native speakers (mean 4.6 vs 3.9, $p=0.009$, $d=0.78$), and reduced anxiety levels (mean 2.0 vs 2.7, $p=0.016$, $d=-0.71$). These large effect sizes (Cohen's $d > 0.78$) demonstrate the substantial practical significance of the chatbot intervention.

The results confirm that AI-based chatbots can significantly enhance both the technical and affective dimensions of language learning. By providing personalized, interactive practice while reducing learning anxiety, chatbot technology addresses key challenges in foreign language acquisition. The high response accuracy (85.4%) and balanced query distribution across grammar (38%), lexicon (35%), and communication (27%) skills further validate the system's pedagogical value.

These findings support the integration of chatbots as valuable supplements to traditional language instruction. Future research should explore long-term effects through longitudinal studies and adapt this methodology for other languages and educational contexts. The demonstrated success of this approach paves the way for more widespread adoption of AI technologies in language education, particularly for less commonly taught languages like Ukrainian.

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Visualization: G. Vyshnevska, T. Gruba.
Writing – original draft: O. Boiko, T. Gruba.
Writing – review & editing: G. Norik, G. Vyshnevska.

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Бойко Ольга, Геворкян Норік, Вишневська Галина, Дерев'янко Людмила, Таміла Груба. Інтерактивне вивчення української мови серед студентів за допомогою чат-ботів на базі штучного інтелекту.*Журнал Прикарпатського університету імені Василя Стефаника*, **13** (1) (2026), 43-55.

Актуальність цього дослідження зумовлена потребою в інтеграції інноваційних цифрових інструментів, зокрема чат-ботів на основі штучного інтелекту (AI), в освітній процес для підвищення ефективності вивчення мови та адаптації до сучасних освітніх викликів. Метою роботи було комплексне оцінювання ефективності інтеграції AI-чат-бота у процес вивчення української мови, з фокусом на розвиток мовних компетенцій і мотивації студентів. Дослідження ґрунтується на експерименті за участю 96 студентів, розділених на контрольну (традиційні методи) та експериментальну (з використанням чат-бота) групи. Використано комплекс методів: тестування за допомогою батареї тестів ставлення/мотивації (AMTB), метрики обробки природної мови (NLP) – BLEU (75%) та ROUGE-L (82%) для оцінки якості відповідей, і глибокий аналіз файлів журналів взаємодії. Для статистичної валідації даних застосовано t-критерій Стьюдента. Отримані результати виявили статистично значущу перевагу експериментальної групи. Студенти цієї групи продемонстрували вищу релевантність відповідей (4,2 бала проти 3,5 у контрольної), покращені показники граматичної (76,4 vs. 62,3) та лексичної компетентності (79,9 vs. 70,1). Мотиваційний тест також зафіксував суттєві позитивні зрушення: середній бал інтересу до мови становив 4,5 (vs. 3,8), а рівень тривожності значно знизився до 2,0 (vs. 2,7). Наукова новизна дослідження полягає у розробці та апробації спеціалізованого AI-чат-бота для вивчення української мови, що ґрунтується на архітектурі трансформерів, і впровадженні інтегрованого підходу до оцінки, що одночасно охоплює технологічну ефективність (через NLP-метрики та аналіз лог-файлів) і педагогічно-психологічний вплив (на мотивацію та тривожність). Результати підтверджують, що інтеграція AI-чат-ботів є ефективним інструментом для підвищення мотивації, академічних досягнень, розвитку мовних навичок і зниження тривожності. Перспективи подальших досліджень включають аналіз довгострокового впливу, адаптацію методики для інших дисциплін і культурних середовищ.

Ключові слова: обробка природної мови, машинне навчання, вища освіта, мовна компетентність, інтерактивне навчання, чат-боти, штучний інтелект.