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USING ARTIFICIAL INTELLIGENCE-BASED CHATBOTS FOR INTERACTIVE UKRAINIAN LANGUAGE LEARNING

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ABSTRACT

The use of chatbots based on artificial intelligence (AI) for teaching the Ukrainian language was considered highly relevant in the context of the digitalization of education and the increasing demand to make students' speech development more effective. Interactive tools were found to engage students more actively in the learning process, addressing the limitations of traditional methods that often failed to accommodate individual learners' needs.

The aim of the study was to evaluate the impact of AI-based chatbots on the development of speech competencies among secondary school students. The methodology included a questionnaire survey of students, a pedagogical experiment involving chatbot-assisted learning, comparative analysis of learning outcomes between the control group (CG) and the experimental group (EG), and systematic observation of speaking activity.

The study confirmed that the use of chatbots significantly improved students' speaking skills, increased their motivation, and enhanced lesson interactivity. Specifically, the EG students demonstrated a 27% improvement in productive speech performance and a 35% increase in the number of speech acts. In comparison, the CG showed only a 12% increase in productivity and a 9% rise in speech acts, which was notably lower than the EG results.

The conclusions highlighted that the integration of chatbots contributed to the development of sustainable communicative skills and supported students' motivation to learn. Teachers acknowledged the pedagogical potential of such tools but also emphasized the need for additional training and improved technical infrastructure.

The academic novelty of the research lay in the development of an interactive methodology for teaching Ukrainian, which effectively combined traditional practices with innovative approaches such as personalization and gamification. The practical value consisted in the applicability of the results for improving Ukrainian language instruction, guiding the integration of AI tools into curricula, and enhancing teacher qualifications.

Keywords: *Language Competence, Adaptive Methods, Innovative Approaches, Educational Progress, Educational Interactivity, Digital Pedagogy, Chatbots, Ukrainian Language.*

1. INTRODUCTION

Modern school education was increasingly confronted with challenges caused by the rapid development of AI technologies and the urgent need to adopt more interactive, learner-centered teaching methods. This issue was particularly relevant in the field of Ukrainian language instruction, where the development of students' speech competencies played a crucial role in overall academic and personal growth. Traditional teaching methods often failed to address the learning preferences and cognitive profiles of modern schoolchildren, as they lacked adaptability, interactivity, and involvement in the active learning process.

The significance of this issue stemmed from the observed gap between students' communicative needs and the limited technological support available in conventional classrooms. It was no longer sufficient to rely solely on teacher-centered approaches when students were increasingly exposed to digital environments outside of school.

The use of AI-based chatbots in Ukrainian language instruction was proposed as a promising solution. These technologies were capable of providing a personalized learning path for each student, fostering stable speaking skills, and increasing interest and motivation. However, despite their potential, the integration of such tools into the school setting remained insufficiently researched, particularly within the Ukrainian language domain. This lack of empirical data hindered their full-scale implementation in practice.

In addition to these pedagogical concerns, practical limitations were also identified, including the need to align chatbot-based activities with curriculum standards, the technological constraints of educational institutions, and the insufficient digital competence of teachers. These factors emphasized the necessity for a comprehensive strategy for integrating AI chatbots that would address both instructional and infrastructural challenges.

The present research addressed this pressing educational gap by investigating the impact of AI-based chatbots on interactive Ukrainian language teaching and evaluating their effectiveness in fostering students' communicative competence. It was hypothesized that chatbot integration would significantly enhance students' speaking activity, motivation, and ability to form sustainable communicative habits. Moreover, the use of innovative technologies was expected to not only promote verbal development, but also strengthen students' digital literacy—an essential component of twenty-first-century education.

The aim of the research was to assess the impact of AI-powered chatbots on the development of speaking competencies among primary and secondary school students, as well as to develop informed recommendations for their integration into teaching practices.

The empirical objectives of the study were formulated as follows:
— to examine the impact of chatbot use on the intensity and frequency of students' speech activity;
— to evaluate the contribution of interactive tools to the development of stable and transferable speaking skills;
— to analyze the extent to which chatbots enhance students' motivation to engage in learning the Ukrainian language.

The findings of this study were expected to contribute to the improvement of Ukrainian language teaching methodology, support the effective integration of AI technologies in the school curriculum, and lay the groundwork for future research into interactive language learning in Ukrainian educational settings.

2. LITERATURE REVIEW

The analysis of studies on the use of AI chatbots in education demonstrates different approaches to their integration. On the one hand, they contribute to student engagement and personalization of learning, while having limitations that affect the quality of learning.

Silvestri C., et al. [1] studied the impact of chatbots on critical thinking and students' adaptability in medical education, emphasizing the importance of taking into account the context and users' needs. A similar opinion is held by Sudharshan R., et al. [2], who emphasize the ability of AI tools to simplify complex educational materials, which is especially useful for students with different levels of training. At the same time, Sudharshan R., et al. [2] emphasize the risks of oversimplification of content, which can reduce the depth of acquiring knowledge, while Silvestri C., et al. [1] focus on the cognitive benefits of interactive technologies.

Tao W., Yang J., and Qu X. [3] explored Chinese medical students' attitudes towards chatbots in education, finding their effectiveness in accessing resources and developing self-directed learning. However, unlike Sudharshan R., Shen A., Gupta S., and Zhang-Nunes S. [2], who focus on the adaptation of materials, Tao W., Yang J., and Qu X. [3] emphasize the importance of students' technical literacy as a determining factor for the successful implementation of AI tools.

Tian W., et al. [4] conducted an analysis based on the UTAUT and ECM models, identifying that the key factors in the perception of chatbots are their convenience, usability, and technical support.

Vanichvasin P. [5] and Yuan C., Li C., Peng C. [6] consider AI chatbots as an effective digital learning tool. Both studies confirm that interactive learning increases student engagement and promotes deeper learning of the material. At the same time, the authors emphasize that the effectiveness of such technologies largely depends on the quality of their design and adaptation to user needs, which is crucial for their successful implementation.

Rekik S., Elamine M., and Belguith L. [7] emphasize the linguistic specifics of chatbots for learning, in particular the use of the Tunisian dialect, emphasizing that the effectiveness of such tools depends on the quality of the content, which requires significant resources. This contrasts with the approach of Yuan C., Li C., and Peng C. [6], who focus on the technological integration of AI tools into the learning process, while Rekik S., Elamine M., and Belguith L. [7] focus on linguistic adaptation.

Rese A., Ganster L., and Daniel B. [8] dealt with the perception of chatbots in retail communication, but their findings on the usability and accessibility of the technology are relevant to the educational context. Like Vanichvasin P. [5], the authors emphasize the importance of user experience in designing AI solutions, emphasizing that the design of chatbots plays a key role in their effectiveness.

Arif T., Munaf U., and Ul-Haque I. [9] examine the advantages and disadvantages of AI tools in medical education, noting that while chatbots simplify access to information, their overuse can reduce student autonomy and critical thinking. This contradicts the findings of Vanichvasin P. [5], who views chatbots as a positive factor in the learning process only, while Arif T., Munaf U., and Ul-Haque I. [9] emphasize the need for a balanced approach between technology and students' independent thinking.

Morreel S., Verhoeven V., and Mathysen D. [10] investigated the effectiveness of AI chatbots in performing medical licensing tests, revealing significant potential for these tools to automate learning. In contrast to Parekh A., et al. [11], who consider chatbots as a means of analysing educational materials, Morreel S., Verhoeven V., and Mathysen D. [10] focus on their performance in completing specific tasks. At the same time, their findings are criticized because of the limited ability of AI tools to understand context, which is important in the educational process.

Parekh A., et al. [11] emphasize the capabilities of AI chatbots in the comparative analysis of educational materials in the field of medicine. The researchers found that these tools are able to adapt complex medical materials to the patients' needs, contributing to better understanding of the information. However, in contrast to Morreel S., Verhoeven V., and Mathysen D., [10] who state the effectiveness of chatbots in completing test tasks, Parekh A., et al. note that technologies cannot yet replace professional educators because of the lack of human intuition and the ability to adapt in complex situations.

Pillai R. and Sivathanu B. [12] investigated the implementation of AI chatbots in the hospitality and tourism sector, analysing their impact on customer interactions. The authors emphasize the high level of adoption of the technology among users, while pointing out the insufficient level of personalization of services, which can be critical in an educational context. This contradicts the findings of Morreel S., Verhoeven V. and Mathysen D. [10], who argue that chatbots can effectively support the learning process, especially in standardized tasks. At the same time, this aspect is supported by those researchers who believe that interactive AI tools have greater potential in tasks with clearly defined parameters, for example, in knowledge testing.

Qiao H. and Zhao A. [13] studied the impact of AI chatbots on the development of students' language skills and self-regulation in a Chinese context of teaching English as a foreign language (EFL). The researchers concluded that interactive tools can significantly increase students'

language activity and independence. However, unlike Morreel S., Verhoeven V. and Mathysen D. [10], who analyse AI within test tasks, Qiao H. and Zhao A. [13] emphasize the need for significant adaptation of such technologies to cultural and linguistic features, which makes them less universal. This approach correlates with the findings of Pillai R. and Sivathanu B., who also point out that the effectiveness of chatbots largely depends on their ability to take into account the specifics of the context in which they are used.

Quintans-Júnior L., et al. [14] call ChatGPT "the new panacea of the academic world", emphasizing its ability to support students in solving a variety of academic tasks. At the same time, the authors emphasize that the excessive use of such tools can contribute to the loss of critical thinking and a decrease in academic autonomy, which causes controversial discussions among researchers.

Raiche A., et al. [15] investigated factors influencing the acceptance and trust of chatbots in risk assessment training among youth offenders. The authors' findings suggest that the acceptance of technologies is largely dependent on their reliability and algorithmic transparency. This finding is consistent with other studies that emphasize the importance of creating user-cantered technologies.

The issue of sustainability and adaptability of chatbot tools was also reflected in previous studies. For instance, Rodriguez S. and Mune C. [16] investigated the implementation of a chatbot-based virtual reference tool in an academic library setting. Their findings emphasized the substantial potential of chatbots to automate routine tasks and streamline access to information. However, they also highlighted that the long-term efficiency of such tools depends on regular content updates and ongoing technical adjustments.

This conclusion corresponds to the challenges observed in the present study, where the effectiveness of chatbot-assisted learning was conditioned not only by pedagogical design, but also by the availability of updated content, school infrastructure, and teacher digital readiness. Therefore, while the educational potential of AI chatbots is evident, their consistent implementation requires systemic support and periodic optimization to maintain relevance and engagement in the learning process.

3. METHODS

The study was conducted in three stages to assess the effectiveness of AI-based chatbots in teaching Ukrainian to primary and secondary school students. Special attention was paid to the adaptation of interactive tools for the development of speaking skills and the students' involvement in active learning.

The first stage involved a theoretical analysis of academic publications, experience in implementing chatbots in educational institutions of different countries and approaches to their development for speaking progress was carried out. Key trends and gaps in the issue under research were identified.

The second stage involved a pedagogical experiment in three secondary schools in Ukraine (Kyiv, Lviv, Kharkiv) with the participation of 120 students (40 from each school), divided into the CG and EG. Chatbots were used to develop speaking skills, practice grammar and vocabulary. The level of success, motivation, and speaking activity of students were analysed.

The third stage focused on processing and interpreting the collected data using a combination of quantitative and qualitative approaches. A t-test for independent samples was applied to compare the performance metrics between the CG and EG. Pearson's correlation coefficient was used to evaluate the relationship between chatbot usage frequency and the level of speech activity. In addition, one-way analysis of variance (ANOVA) helped determine the degree of difference in content assimilation across groups. The statistical procedures were performed using SPSS software to ensure the reliability and validity of results. The outcomes of this stage served as a basis for the development of practical recommendations aimed at improving Ukrainian language instruction through AI integration.

3.1. Methods.

The overall research design was quasi-experimental and based on a mixed-methods approach, combining empirical classroom observation with survey-based diagnostics and statistical analysis. A diagnostic student survey was administered to collect data on students' motivation, perceptions of chatbot usability, and the perceived impact of these tools on their learning experience. The survey included both open-ended and closed-

ended questions to capture a wide range of feedback and ensure variability in responses.

In parallel, the pedagogical experiment formed the core of the study, enabling a comparative analysis of learning outcomes between the experimental group (EG), which used chatbots as part of their learning process, and the control group (CG), which followed traditional instruction. This experimental component allowed for a systematic assessment of how chatbot-supported teaching influenced academic performance and oral language development.

Statistical analysis was conducted using SPSS software, which facilitated the evaluation of statistical significance, the reliability of experimental results, and the identification of key interdependencies between chatbot usage and student performance indicators. Additionally, content analysis was applied to interpret qualitative data obtained from open-ended survey questions, as well as to evaluate the relevance, clarity, and engagement level of the interactive materials delivered through chatbot platforms.

Table 1 presents a programme for using chatbots in the educational process, including categories of learning, types of tasks, frequency of their completion, and methods for evaluating results. This is the basis for systematizing the approach to integrating AI tools into students' language training.

Table 1. Programme for using chatbots in the educational process

Learning Category	Task type	Frequency of use	Methods of assessing results
Building of grammar skills	Defining parts of speech in a sentence	2 times a week 45 minutes each	Test assessment (automated analysis of answers)
Expanding vocabulary	Selecting synonyms for words in context	2 times a week 40 minutes each	Test assessment (open questions)
Development of speaking Skills	Role-playing dialogues (ordering food, going to the store, visiting the doctor)	2 times a week for 45 minutes	Observation of student activity, oral answers
Dictations	Recording dictations after listening	1 time a week 30 minutes each	Checking written works
Testing	Grammar and vocabulary test (multiple choice, open questions)	1 time every 2 weeks 45 each	Automated testing, analysis of the level of assimilation

Source: developed by the authors based on the results of their own research.

3.2. Sample.

The students (120 people): 40 students from each school, evenly divided into the CG and EGs. The selection was carried out among secondary school students (12–13 years old) according to the criteria of the level of educational achievements and readiness to participate in the experiment. The choice of this age range is determined by the fact that speaking competence is actively formed during this period, and students have a sufficient level of digital literacy to interact with AI chatbots, but do not yet have the abstract thinking skills to independently assess the effectiveness of new educational tools.

3.3. Instruments.

— Chatbots: Two types of chatbots developed on the basis of the Dialogflow and ChatGPT platforms were used, each having its own specifics. The Dialogflow-based chatbot was mainly used for grammar training and vocabulary expansion, providing students with exercises with automated error analysis. The ChatGPT-based chatbot was used to activate speaking skills, simulating real dialogues and adapting answers according to the level of language proficiency. This provided a comprehensive approach to the development of students' speaking competence.

— Google Forms: for conducting surveys among students.

— SPSS: for processing data from the pedagogical experiment.

Evaluation criteria: success in completing tasks, active participation in interactive tasks, motivation level.

The use of these methods and tools provided comprehensive results that meet the aim of the study and made it possible to assess the effectiveness of integrating AI tools into the school educational process.

4. RESULTS

The study demonstrated significant differences in the academic performance of students in the EG and CG. The students who used interactive chatbots showed a noticeable improvement in speech activity, learning new lexical units, and grammatical correctness of statements. The combination of traditional methods with interactive digital tools proved to be particularly effective, which contributed to an increase in the level of student involvement in the learning process.

The results of the two groups were compared according to the following criteria: the number of speech acts during lessons, the frequency of use of new lexical units, the grammatical correctness of sentence construction, and the level of participation in interactive tasks. The generalized indicators of changes in speech activity and the level of knowledge of the material learnt are presented in Table 2.

Table 2. Comparison of the number of speech acts between the EG and CG

Criterion	EG	CG	Difference (%)
Average number of speech acts at the beginning of the study	13,5	12	1,5
Average number of speech acts after the study	18,3	13,5	4,8
Increase in speech acts (%)	35	12	23
Level of involvement in interactive tasks (%)	84	62	22
Frequency of use of new lexical units (%)	88	64	24
Increase in the number of correct grammatical constructions (%)	28	9	19
Average score for speech tests	86	74	12
Lexical acquisition (new words per week)	15	9	67
Successful use of vocabulary in role-playing dialogues (%)	88	64	24

Source: developed by the authors based on the results of their own research.

The analysis showed that the speech activity of the EG students increased from 13.5 to 18.3 actions per lesson (by 35%). The students who interacted with the chatbot three times a week showed progress in the formation of constructions in 78% of cases, compared to 52% in those who completed tasks only during lessons.

92% of the tasks in the EG were grammatically correct, which is 28% more than the initial indicators, while this indicator increased by only 9% (to 73%) in the CG. The EG students learned an average of 15 new words per week, compared to 9 words in the CG. Vocabulary in role-playing dialogues was successfully used by 88% of the EG students, compared to 64% in the CG.

Figure 1 shows a comparison of the level of learnt new lexical units, grammatical correctness of completed tasks, and use of complex syntactic constructions between the EG and CG.

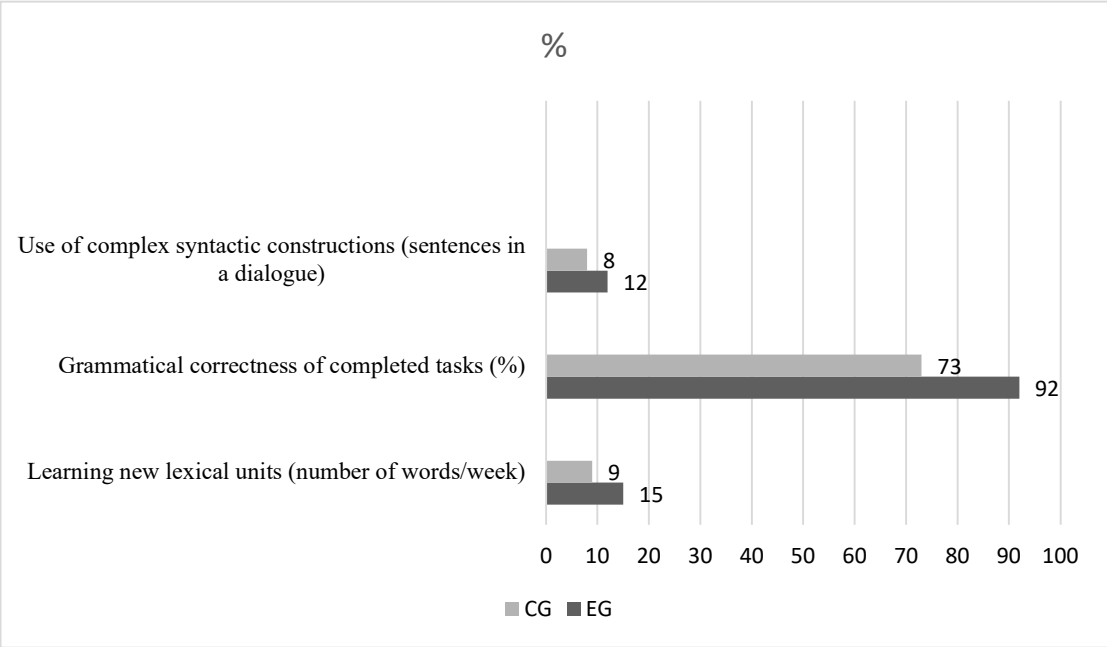

Figure 1. The level of vocabulary and grammar in the EG and CG after the experiment. Source: developed by the authors based on the results of their own research.

Chatbots personalized tasks, which increased learning efficiency. The EG students built complex speech structures 45% more often, using an average of 12 complex sentences per task versus 8 in the CG. The use of new vocabulary increased by 24%, with 88% of the EG students successfully using it in dialogues.

Interactive exercises that simulated real communication situations enhanced interest and stimulated active language use. Instant feedback contributed to the prompt correction of errors, improving the quality of tasks. The survey showed that 91% of the EG students found learning more interesting with chatbots, while this figure was only 68% in the CG.

Gamification and task adaptation enhanced motivation: 84% of the EG students enjoyed working with the chatbot, compared to 62% in the CG. In addition, 79% noted that interactive exercises helped them to better learn the material, reduced their fear of making mistakes, and increased their confidence in their knowledge.

Figure 2 shows the level of the EG students' interest in learning with the use of chatbots.

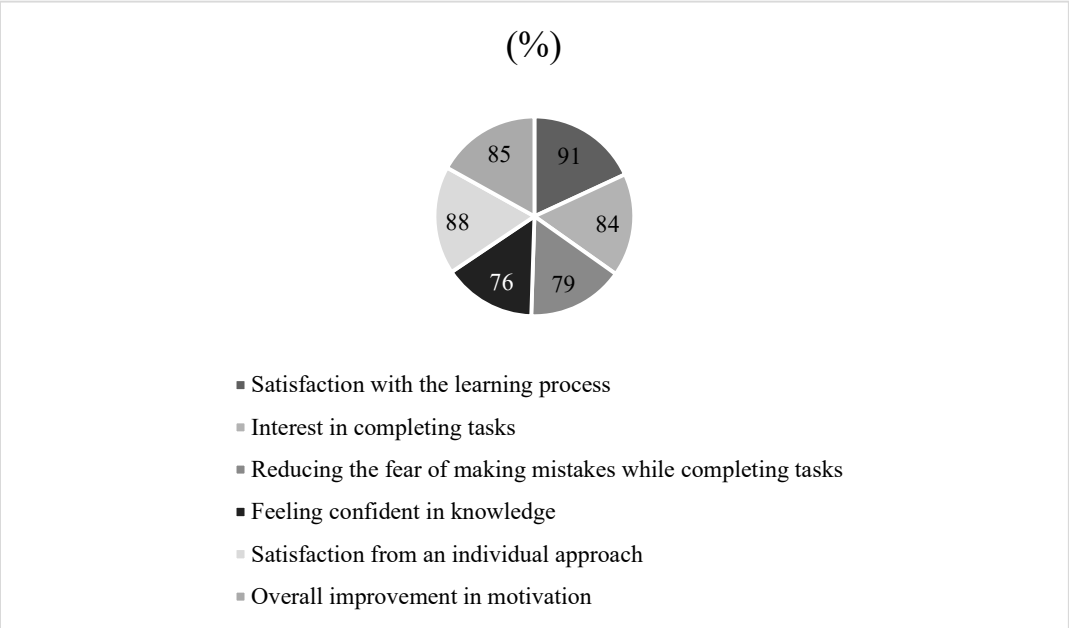

Figure 2. The level of the EG students' interest in learning using chatbots.
Source: developed by the authors based on the results of their own research.

Gamification, interactivity, and a personalized approach were key factors that enhanced the EG students' interest in learning. The use of game achievements created a competitive environment, and instant feedback contributed to more effective learning of the material. A total of 91% of the EG students noted that learning became more interesting with the use of chatbots, 84% enjoyed completing tasks, and 79% noted that interactive exercises helped them to reduce their fear of making mistakes. The personalization of the learning process also contributed to an increase in confidence in knowledge in 76% of students and enhanced their motivation. Moreover, 88% of students positively assessed the individual approach, which confirms the importance of adaptive learning technologies.

The introduction of AI tools also aroused interest among teachers: 78% of teachers noted the potential of these technologies in the educational process, but only 54% felt technically prepared. The main barriers were insufficient technical support (65%) and limited access to educational materials (48%), although 82% of teachers expressed their willingness to undergo additional training to integrate digital technologies into teaching.

Table 3 presents a comparison of the initial and final indicators of speech activity, vocabulary expansion, grammatical correctness, level of involvement, satisfaction with the educational process, reduction of fear of mistakes and confidence in knowledge in the CG and EG.

Table 3. Final comparison of results before and after the experiment

Indicator	EG (before)	EG (after)	CG (before)	CG (after)	Difference in the EG (%)	Difference in the CG (%)
Average number of speech acts per lesson	13,5	18,3	12	13,5	35	12
Assimilation of new lexical units (words/week)	9	15	7	9	67	29

Grammatical correctness of completed tasks (%)	72	92	67	73	28	9
Level of involvement in tasks (%)	60	84	55	62	24	7
Satisfaction with the learning process (%)	65	91	58	68	26	10
Reduction in fear of mistakes (%)	54	79	45	54	25	9
Feeling of confidence in knowledge (%)	50	76	43	51	26	8

Source: developed by the authors based on the results of their own research.

After six weeks of training, speech activity in the EG increased by 35% compared to 12% in the CG. The number of new lexical units learnt increased by 67% compared to 29% in the CG. Grammatical accuracy improved by 28% in the group using interactive tools, while in the CG it was only 9%. The level of involvement in interactive tasks increased by 24% (versus 7% in the CG), and satisfaction with the learning process — by 26% (versus 10%). There was also a significant decrease in the fear of mistakes and an increase in confidence in knowledge among the EG students.

5. DISCUSSION

The results of the study confirm the findings of Hwang G. and Chang C. [17], who prove that interactive tools contribute to enhancing motivation and personalized learning. The EG students demonstrated higher involvement in the learning process, which is consistent with the data on the increase in the level of active speech activity and the number of new lexical units learnt. At the same time, unlike their study, our results indicate technical barriers to the AI implementation, such as insufficient teacher training and the availability of technology, which is an important factor in the practical use of chatbots in schools.

As Hirosawa T., et al. [18] prove, generative AI is able to adapt educational content according to the level of students' knowledge, which is confirmed by our observations. Chatbots used in the EG contributed to better assimilation of educational material, especially in terms of grammar and vocabulary expansion. However, similar to the warnings of Homolak J. [19], a risk of uncritical perception of information was identified, as students could unconditionally accept AI responses without analysing their accuracy.

The obtained data are consistent with the conclusions of Hügle T. [20], who emphasizes the potential of large language models in education. Our study showed that the integration of chatbots contributed not only to increasing student activity, but also to improving their language skills. However, as the author notes, the effectiveness of the technology depends on its adaptation to specific educational tasks. The EG teachers noted the need to configure chatbots to the school curriculum and adjust responses to prevent errors.

The role of AI chatbots in supporting the learning process is also confirmed by the study of Koivisto M. [21]. In our experiment, chatbots were as an additional tool for speech practice, but could not completely replace traditional teaching. This is consistent with the author's conclusions that although AI can improve the learning experience, human mentoring remains necessary for deep learning of the material.

The level of acceptance of AI tools is a critical factor for their effectiveness in education, which is consistent with the conclusions of Li L., Peng W. and Rheu M. [22]. As the data showed, the students who trusted the recommendations of chatbots and actively interacted with them demonstrated higher results in expanding vocabulary and development of speaking skills. At the same time, some scepticism was recorded among teachers regarding the implementation of such tools, which

indicates the need for additional methodological training and increasing the teachers' digital literacy.

The importance of regulating the use of AI tools in education, as emphasized by Madani N., et al. [23], is also reflected in our study. The use of chatbots in school education requires clear rules of integration, especially regarding the personalization of curricula and the ethical aspects of the AI use. In our study, the EG teachers noted the need to develop recommendations for the effective use of the technology, which coincides with the conclusions about the need for regulatory approaches.

The obtained results are consistent with the conclusions of Menkhoff T. and Teo Y. [24], as well as Misra D. and Chandwar K. [25], who argue that interactive AI tools improve learning outcomes, but require mentoring from teachers. As in the study of Misra D. and Chandwar K. [25], our study showed that although chatbots accelerate learning of the material, they cannot completely replace traditional teaching methods. The use of AI significantly increased students' speaking activity, but there was a need to adapt the educational content to avoid the risk of oversimplification of the material and loss of depth of knowledge.

It is important to adhere to ethical standards when implementing AI in the educational process, which is consistent with the findings of Ali M. and Djalilian A. [26]. As in the case of academic writing, the use of interactive technologies in education requires transparency and a clear definition of the boundaries of responsibility of students and teachers. The results showed that although chatbots improve language skills, their responses are not always error-free, which confirms the importance of monitoring the accuracy of AI content and its compliance with educational standards.

As Baglivo F. et al. [27], as well as Cheah M. H. et al. [28] noted, the effectiveness of AI tools largely depends on adapting the content to the needs of the target audience. Our study confirms that it is necessary to take into account the level of students' preparation and their speech characteristics for the successful use of chatbots in education. The EG students who had a higher level of trust in AI demonstrated better results in learning vocabulary and grammar, which indicates the importance of personalizing technologies according to age specifics.

The obtained data are consistent with the findings of Feng Y. and Wang X. [29], who confirmed that interaction with AI enhances student interest and activity. However, as these authors note, a complete replacement of traditional teaching methods can lead to a decrease in the level of critical thinking. In our experiment, the integration of chatbots had a positive effect on student speech activity, but the best results were demonstrated by those who combined the AI use with classical teaching methods. This confirms the importance of a combined approach, where digital technologies complement traditional pedagogical methods, rather than completely replacing them.

The process of students' adaptation to interactive educational technologies has common features with adaptation to a new social or educational environment, which is consistent with the findings of Zhylin M. et al. [30] and Ishchenko Y., Rusnak A. et al. [31]. As in their studies, our study indicates the importance of supporting and gradually introducing new approaches to learning. Students who actively interacted with chatbots adapted more easily to the new format of classes, which confirms the need to integrate technologies while taking into account the psychological aspects of adaptation.

As Zayed N. et al. [32] noted, digital literacy is a key factor in successful adaptation to new conditions, which is also confirmed by the results of our study. The EG students, who had a higher level of mastery of digital tools, demonstrated better results in speech activity and learning of educational material. This indicates the need to develop digital competencies among students and teachers for the effective implementation of interactive educational technologies.

Despite the difference in thematic focus, the findings of Hubanova T. et al. [33] on the role of information technology in crime prevention may be useful for considering interactive chatbots as tools for social integration. Our study found that the use of AI chatbots contributed not only to improving speaking skills, but also to creating a more comfortable learning environment where students felt more confident during speech practice. This confirms the potential of interactive technologies in regulating the educational space and adapting students to changes in the learning process.

The analysis of the above-mentioned studies confirms that the use of chatbots can

significantly increase the effectiveness of the educational process through interactivity, personalization and adaptability. At the same time, most authors emphasize the need to take into account ethical, cultural and pedagogical aspects to ensure the harmonious implementation of these technologies in the education system. This indicates the relevance of further research towards improving chatbots as learning tools.

The findings of this study reinforced these conclusions, showing notable improvements in students' speaking skills and motivation. However, limitations such as the need for updated content, teacher preparedness, and infrastructure became evident. The effectiveness of chatbot integration was found to depend not only on the tool itself, but also on external educational conditions.

Certain aspects remained outside the scope of this research — particularly emotional engagement, long-term skill retention, and comparative analysis of chatbot types. These open questions point to the need for continued investigation into the broader implications of AI use in education.

6. LIMITATIONS

The study is limited by differences in school technology and teacher training, which affected the quality of chatbot use. The sample size (120 students and 15 teachers) and the study conducted in only three schools may not be sufficient to capture regional differences. The functions of the chatbots used also had some limitations regarding educational needs.

7. RECOMMENDATIONS

In order to improve interactive teaching of the Ukrainian language using chatbots, it is recommended to provide schools with modern equipment and stable Internet, as well as develop teacher training programmes with methods for integrating AI tools. It is appropriate to expand the sample of further research and create chatbots adapted to educational programmes, taking into account the age and cognitive characteristics of students.

8. CONCLUSION

The results of the study confirmed the effectiveness of using chatbots in teaching the Ukrainian language to primary and secondary school students. The use of interactive tools contributed to an increase in speech activity, the development of sustainable skills, and learning motivation. The EG students showed an improvement in speech skills by 27% compared to the CG.

Teachers noted the potential of interactive tools for improving the educational process, but emphasized the need for additional training and improving technical support.

The academic novelty of the study is the use of an innovative approach to teaching the Ukrainian language using chatbots, which combines interactivity, personalization, and gamification.

The practical value of the research is the possibility of using the results to improve the methods of teaching the Ukrainian language, develop recommendations for integrating AI tools into curricula, and improve the teachers' qualification.

At the same time, this work did not address several critical aspects such as long-term retention of acquired speech skills, the impact of chatbot use on writing and reading competencies, or the emotional dynamics of learner interaction with AI tools. These limitations define the scope of the present study.

Further research is needed to explore how chatbot-based instruction can be scaled across different educational settings, especially in rural or low-resource environments, and to assess the sustainability of learning outcomes over time.

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