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# Evaluating the Impact of AI-Based Tools on Language Proficiency and Motivation: Experimental Evidence from Philology Students in Ukraine

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**Abstract:** This study evaluates the impact of AI-based tools on language learning outcomes—specifically language proficiency and student motivation—among philology students in Ukrainian higher education. Grounded in the Technology Acceptance Model (TAM) and Constructivist Learning Theory, the research employed a controlled experimental design involving 100 students, randomly assigned to experimental (AI-based tools) and control (traditional classroom) groups. Over an 8-week intervention, the experimental group used Duolingo, while the control group followed standard curriculum-based instruction. Statistical analyses (independent t-tests and ANOVA) revealed that the experimental group significantly outperformed the control group in both English and Ukrainian language proficiency, and exhibited higher motivational engagement. These results underscore the pedagogical potential of AI-based applications in enhancing personalized learning experiences in bilingual education settings. Despite its limited duration, the study highlights key benefits of integrating AI into philological education and offers practical implications for curriculum developers, educators, and policymakers. Addressing technical and infrastructural challenges remains critical for scaling such innovations across Ukrainian institutions.

**Keywords:** Interactive learning; Personalized learning; Outcomes; Motivation; Engagement; Efficacy

**JEL Classification:** I20, O33, I28

## 1. Introduction

Philological education is relevant in Ukraine due to its role in promoting and preserving the country's cultural heritage and rich linguistic diversity. According to Prokopenko et al. (2024), philological education encompasses various fields, including literature, culture, and language studies, which help learners gain a deeper understanding of the complex nature of human interaction. In Ukraine, philological education is practically applied, equipping learners with valuable skills in translation, interpretation, and language teaching. As Seitenova et al. (2023) note, these skills are in high demand in industries such as government, international business, and education. Through philological education, learners develop essential communication, analytical, and critical thinking skills, which are vital for career success. In recent times, the world has witnessed a significant shift toward language learning using technology-enhanced tools. Nguyen & Stracke (2021) observe that the advent of digital technologies has transformed the way languages are learned and taught. English Language learning has become more engaging, accessible, and flexible due to virtual learning environments, social media platforms, and mobile applications. This

new approach has created more opportunities for philology learners in Ukraine to access various resources and interact with learners worldwide (Bostanci, 2022). The integration of technology into language learning offers numerous benefits, including access to authentic materials, personalized learning experiences, and increased flexibility. However, there are also challenges of integrating technology in language education. Turchyn et al. (2023) point out that some of these challenges include the development of high-quality digital resources and effective teacher training. Despite these challenges, incorporating technology-enhanced language learning into philology education in Ukraine can modernize pedagogical practices and improve students' academic achievement. When teachers in Ukraine utilize digital technologies, they create more interactive and engaging educational setting. The teaching of the English language has been linked to several problems affecting the learning experience. Zhu & Liu (2020) stress that limited interactivity is one of the most critical issues, as conventional classroom settings often rely on static materials, lectures, and textbooks. This can lead to learners passively engaging with the language, resulting in a lack of motivation and enthusiasm, which implies that learners may not be fully engaged in the learning process. Another major issue is the low academic engagement of students. Bushman (2022) notes that limiting language instruction to rote memorization and repetitive exercises can cause learners to lose interest, as they feel disconnected from the learning process. This disconnection can lead to inadequate practical language skills and low retention rates.

English Language and Ukrainian Language teaching in traditional settings often follows a rigid structure, which can make it challenging for students to apply their interaction skills in real-life situat. Chetia & Bhatt (2020) argue that interactions in traditional classroom settings are artificial, which does not adequately prepare learners for the complexities associated with authentic language use. As a result, learners often feel uncertain and unprepared when they encounter real-world scenarios. Interestingly, these problems tend to be addressed through the emergence of innovative technologies. Romanchuk et al. (2023) state that AI-based applications cater to the abilities and needs of learners by offering highly personalized learning experiences. These AI-based applications provide interactive learning exercises, adapt to different learning styles, and encourage immediate feedback, it makes learning of language more flexible, accessible and engaging (Damanik & Katemba, 2021). Modern techologies such as Virtual Reality (VR) and Augmented Reality (AR) help learners achieve this by effectively communicating and interacting with their colleagues, thereby simulating the use of language in real-life situations. Virtual settings enable students to practically apply language skills and interact with virtual characters in a highly engaging and interactive manner. When elements of game design are incorporated into language learning, teachers find it easier to create a motivating and engaging learning environment, which aids learners in developing language skills and practically applying them in real-life situations (Shakhanova & Zhyltyrova, 2023). Gamification provides learners with adequate feedback and promotes healthy competition, improving motivation and academic engagement. According to Imanova et al. (2025), these modern technologies make language teaching immersive, interactive, and engaging. By utilizing gamification, VR, AR, and AI, teachers provide a student-centered academic environment that addresses the complex needs and learning styles of students. This approach makes the learning process more effective, leading to improvements in language skills and academic engagement among students. It can bridge the apparent gap between classroom instruction and real-life language use. Therefore, it is essential for educators to provide students with different opportunities to apply their skills in authentic, immersive, and interactive environments, enabling them to address complex problems that arise in real-world communication (Zhunussova et al., 2022). This will help learners develop confidence and become effective communication and competent language users, well-equipped to succeed in both the present and the long run.

### 1.1 Problem Statement

Integrating and using AI-based technologies in promoting philological education in Ukraine have become a concern for educational stakeholders and researchers due to the potential benefits of technology-enhanced learning. However, despite the recognized advantages, a noticeable gap remains in the existing knowledge concerning the adoption of modern technologies into philological education, particularly in the context of both English and Ukrainian languages. Specifically, there is paucity of empirical evidence on the effect of technology integration on learning outcomes, institutional policies, and pedagogical practices for students of different specialties, including those studying English and Ukrainian philology. Many studies highlight the theoretical advantages of adopting and integrating technologies without empirically evaluating their impact on learning outcomes, institutional policies, and pedagogical practices. This paucity of empirical studies hinders the identification of best practices, effective teaching methods, and technologies, as well as informed investment and support. Furthermore, the lack of assessment tools and robust evaluation frameworks impedes the development of practices and policies that are essential for implementing technologies in a manner that ensures teaching and learning meet quality standards for both languages. The uneven adoption of modern technologies is another gap existing in philological practices in Ukraine. Although some universities have taken relevant steps to effectively integrate modern technologies into their philological educational programs for English and Ukrainian, many institutions are lagging behind due to the absence of technical support, inadequate resources, and poor infrastructural facilities.

Consequently, disparities exist in the quality of education received by learners, with some students limited to traditional classroom settings while others receive instruction through state-of-the-art technologies. Moreover, many teachers lack the confidence and skills needed to integrate modern technologies into their pedagogical practices effectively for teaching both English and Ukrainian languages. The absence of ongoing technical support and professional development opportunities affects the quality of language instruction. Therefore, it is crucial to address these gaps to ensure the effective integration of modern technologies into philological education in Ukraine, catering to the needs of students studying both English and Ukrainian languages.

### 1.2 Research Aim

This research evaluates the effectiveness of AI-based language learning applications compared to traditional classroom methods in improving English and Ukrainian language proficiency among philology students in Ukraine.

### 1.3 Research Questions

RQ1. How does the utilization of AI-based language learning applications impact language proficiency in English and Ukrainian among philology students compared to traditional teaching methods?

RQ2. What is the impact of AI-based tools on students' motivation and engagement in English and Ukrainian language learning?

RQ3. What are the challenges and limitations of integrating AI-based tools into philological education in Ukraine for both English and Ukrainian languages?

### 1.4 Hypotheses

H1: Students using an AI-based language learning application will demonstrate significantly high improvements in language proficiency in English and Ukrainian when compared to those using traditional settings.

H2: The use of AI-based tools will increase students' motivation and engagement in English and Ukrainian language learning compared to traditional methods.

### 1.5 Significance

The findings of this study will be of immense benefit to students, educators and policymakers in enhancing English language learning in Ukraine.

The findings of this study will be of immense benefit to students, educators, and policymakers in enhancing the learning of English language in Ukraine. For students, the study will provide valuable insights to improve their language learning experiences and outcomes. By exploring the benefits and challenges of technology integration, this study will inform the development of effective English language programs that cater to students' needs in the digital age.

Educators will benefit from the study's findings, which will enhance their pedagogical practices and improve student academic achievement. Moreover, the result of this study on the support and training of teachers can harness development programs for equipping educators with the skills and confidence that are required for effective integration of technologies in their pedagogical practices.

The result of this research will also benefit to educational policymakers as provide them with more ideas on how to make good educational policies that will promote the utilization of technologies in learning a language. As this research examines the state of adopting modern technologies in Ukraine's tertiary institutions, educational policymakers will be motivated more to develop better initiatives and policies that encourage effective adoption and utilization of modern technology in language learning and experience. Through the findings of this research, educational policymakers will be informed on the problems and advantages of integrating technology so that they can be motivated to provide technical support, teacher training and infrastructure to meet the needs of philological education in the present time.

## 2. Literature Review

The adoption and use of AI-based technologies in learning of language have transformed the ways of educating people about language proficiency. The emergence of innovative technologies, as opined by Manan et al. (2021), offers different platforms and relevant tools that resolves the problems and learning styles of learners in language learning. Moreover, Figueroa et al. (2024) maintain that different technologies have gained relevant recognition and attention for their potential, which goes a long way to experience in the learning of language; some of these

technologies are gamified platforms, VR/AR tools and AI-based applications. Grammarly and Duolingo are AI-based applications that are much recognized for language learning (Table 1). For example, Grammarly focuses on providing real-time feedback, developing grammar skills and writing, as well as offering suggestions for language improvement (Hajar et al., 2023).

**Table 1.** Comparison of AI-based language learning application and traditional classroom methods

| Aspect | AI-based Language Learning Application | Traditional Classroom Methods |
|---|---|---|
| **Personalization** | Tailors learning experience to individual needs and pace | One-size-fits-all approach, limited personalization |
| **Motivation** | Interactive and engaging, potential to increase motivation | May lack engagement, motivation dependent on teacher |
| **Accessibility** | Accessible anywhere, anytime, flexible learning schedule | Limited by location and time, rigid schedule |
| **Feedback** | Immediate feedback, automated assessment | Feedback dependent on teacher expertise, peer interaction and classroom environment |
| **Language Proficiency** | Potential for improved language skills through interactive exercises and real-time practice | Dependent on teacher expertise, peer interaction, and classroom environment |
| **Limitations** | Technical issues, lack of human interaction limited context | Limited flexibility, potential for boredom, dependent on teacher quality |

In other words, Duolingo creates personalized language learning that adapts to users' weaknesses, strengths, and learning pace, utilizing machine algorithms for effective learning. Through AI-driven technology, the writing styles and errors of users are analyzed, and potential recommendations are made to enhance their writing skills (Boiko et al., 2025). Kahoot is one of the most recognized gamification platforms in language learning worldwide. Teachers who use Kahoot create discussions, interactive quizzes and surveys that enhance the academic engagement of the learners as they actively participate in the teaching-learning process (Ahn & Smagulova, 2022). The game-based approach has a platform that encourages fun and competitive learning. This encourages students and learners to actively engage in their learning. The use of Kahoot by teachers enables them to create customized content in English language learning, which helps students improve and achieve their academic goals.

The adoption and use of emerging technologies, particularly VR and AR, in language learning has been explored in various studies. Manan et al. (2024) posits that AR and VR provide students with interactive environments that stimulate real-life language use. According to Alharthi (2020), these technologies offer experiential learning experiences that promote motivation, retention, and learner engagement. Additionally, AR and VR facilitate adaptive assessment, real-time feedback, and personalized learning experiences, which can lead to improved language proficiency.

Studies have shown that digital technologies, including gamified platforms and AI-based applications, can enhance language learning outcomes. Asyidiq & Akmal (2020) found that these technologies have a positive effect on students' language learning performance, particularly in philological education. Ikwuka et al. (2024) demonstrated that digital technologies can enhance language proficiency in various skills, including speaking, writing, reading, and listening. Moreover, digital technologies have been found to promote motivation and engagement among learners. Yakavets et al. (2023) noted that AI-based apps offer adaptive difficulty levels, personalized feedback, and interactive exercises that promote motivation. Barón & Celaya (2022) found that learners are more active and motivated when using technology-enhanced learning tools. Gamified platforms also promote fun and competition, motivating students to engage actively in the learning environment. The adoption and utilization of VR/AR tools and AI-based technologies create interactive and immersive learning process that enhance academic engagement. Yessenbekova (2023) posited that VR/AR tools promote academic engagement among learners by creating an interactive and immersive learning environment. AI-based applications provide real-time feedback and assessment; it aids learners track their academic success and adjust their learning strategies (Yessenbekova, 2020). Kambatyrova et al. (2022) found that gamified platforms can enhance academic performance in language skills and assessments. By applying these digital technologies, educators can create effective and engaging language learning experiences that addresses the diverse needs of learners in the digital age.

Studies have shown that modern technologies can enhance literature and language studies in philological education (Phung et al., 2020; Sánchez-Auñón & Férez-Mora, 2021). Specifically, digital tools can facilitate text analysis, providing access to vast linguistic corpora and enabling the creation of digital editions (Tran & Le, 2025). In addition, technology can support language learning in several ways. AI-based applications can offer personalized feedback, vocabulary development, and syntax and grammar instruction (Sipii et al., 2024). Gamified platforms, on the other hand, can make language learning more interactive and engaging (Tsang, 2023). The adoption and use of AI-technology in philological education enhance critical thinking competencies and skills, enabling students to analyze and interpret texts more effectively (Bachev, 2022). By leveraging these digital tools, educators tend create learning environment that is engaging and effective for students.

The effectiveness of technology in language learning has been recognized globally, including in Ukraine. While technologies have been adopted in Ukrainian language learning contexts, their effectiveness in integrating AI-based tools is still a subject of investigation (Yessenbekova et al., 2025). Research has shown that technology-enhanced language learning modules can improve learners' motivation and engagement in Ukrainian universities (Bokayev et al., 2020). However, there is a notable gap in empirical studies on English language learning technologies in post-Soviet states and Eastern Europe, including Ukraine. Studies in other Eastern European countries, such as Hungary, Poland, and Serbia, have demonstrated the effectiveness of modern technologies in promoting students' motivation and academic engagement in language studies (Larasati et al., 2021). This highlights the need for further research on the adoption and effectiveness of VR/AR technologies and AI tools in Ukrainian state universities. To address this gap, this study adopts the TAM and constructivist learning theory as its theoretical framework.

### 2.1 The TAM

Fred Davis was the founder of the TAM in 1989. This model offers a framework that is valuable regarding how people adopt and utilize technologies using two key factors. These factors influence the decisions of people in the way and manner they use technology, and they include perceived ease of use and perceived usefulness. Perceived usefulness simply means the extent to which a people believe that technology enhances performance. On the other hand, perceived ease of use implies the level of belief of a person that the using technology will facilitate outcomes (Prabowo & Rizki, 2025).

This model is related to the present study because TAM aids teachers and scholars in determining and understanding how students perceive the ease of use and the usefulness of digital technologies in the context of language learning, particularly for English and Ukrainian languages, such as gamified platforms, VR/AR tools, as well as AI-based applications. Educators easily determine different variables that impact the use and adoption of technologies through the perception of learners and also develop measures to harness the integration and acceptance of these tools in language learning.

### 2.2 Constructivist Learning Theory

Constructivist learning theory is also relevant in the philological study, more particularly in Ukraine; the constructivist learning theory was propounded by Jean Piaget and Lev Vygotsky. This theory provides researchers with a basic understanding of language learning. This theory believes that learners construct their own meaning and knowledge by engaging actively in social interactions as well as their environment. This theory implies that it is necessary to provide learners with opportunities that will aid them to be active in the learning process using digital technologies by allowing learners to construct their own understanding and knowledge as well as explore the concepts of language. Through the combination of constructivist learning theory and the TAM, researchers will gain understanding of how to integrate technologies into language learning effectively for both English and Ukrainian languages. Once this is achieved, it will be easy for researchers to develop effective language learning programs using technology-enhanced tools to support motivation, engagement, and language development, addressing the interests and needs of learners. The combination of constructivist theory and the Technological Acceptance Model in philological education in Ukraine will provide learners with valuable knowledge regarding the adoption and use of digital technologies, thereby enhancing their motivation and academic engagement.

### 2.3 Gap Identification

It appears that a gap exists in the literature regarding the practicality of AI-based tools in teaching English and Ukrainian languages in philological education in Ukraine. In line with the studies reviewed so far, there is inadequate experimental studies that thoroughly compared traditional methods with the integration of AI-based platforms in language learning for both English and Ukrainian. It appears that while there is much research on the advantages of using technology in language learning, to the best of the researcher's knowledge, there is no empirical evidence exists regarding how these AI-based platforms and tools impact the outcomes of learners in both English and Ukrainian languages, particularly in philological education in Ukraine. It, therefore, becomes a significant problem to compare the effectiveness of AI-based tools and traditional methods in language learning in Ukraine due to the absence of related experimental research. Teachers and educational policymakers now rely on theoretical studies to inform their decisions in language learning. In addition, the absence of related experimental research in this aspect reduces people's knowledge and understanding of how technologies can be adopted and utilized in the philological education of Ukraine. Without adequate experimental results on the effectiveness of technologies in language learning, it will be tough for teachers to implement and design programs that use AI-based technologies. The apparent gap in the literature in the context of Ukraine makes the present study necessary.

By integrating the TAM with constructivist theory, this research provides a new perspective on language learning, emphasizing the significance of student-centered environments and the practical application of language skills. Its practical value is demonstrated in the context of bilingual education in Ukraine, offering unique insights into effective approaches to language teaching.

## 3. Methodology

### Research Design

A controlled experimental design was employed in this research to examine the effectiveness of an AI-based language learning application compared to traditional classroom methods in improving language proficiency in English and Ukrainian among students, featuring an experimental group and a control group. The control group was given instructions based on traditional approaches to teaching, whereas the experimental group made use of AI-based tools to learn both English and Ukrainian languages.

### Participants

Participants in this study were 100 Ukrainian students enrolled in philological education programs, aged 18 to 22 years, with an intermediate level of proficiency in both English and Ukrainian. The sample included 55 females and 45 males, of whom 60 had a background in linguistics and 40 had a background in literature. To ensure group equivalence, participants were randomly assigned to either the experimental or control group through a stratified randomization procedure. This procedure involved dividing participants into strata based on their pre-existing proficiency in both languages and then randomly assigning individuals within each stratum to one of the two groups. Stratification minimized potential biases and ensured that both groups were comparable in terms of language proficiency at the outset of the study.

### Control of External Factors

The study was conducted in a controlled environment, and both groups received instruction from the same teacher. In addition, the study was designed to minimize disruptions and ensure that participants in both groups received consistent instruction and support throughout the study period.

### Reliability of Coefficients Used

The language proficiency tests used in this research were validated and demonstrated high-reliability coefficients, with a Cronbach alpha of 0.85 for the pre-test and 0.88 for the post-test. These coefficients indicate that the tests were reliable measures of English language coefficiency.

### Materials

The AI-based tool used in this research is Duolingo, which provides interactive exercises, personalized lessons and real-time feedback. However, lectures, classroom discussions and textbook-based lessons led by experienced teachers in English language teaching were the traditional methods adopted in the control group. In addition, speaking, writing, and listening skills were evaluated through the tests, creating room for effective comparison between traditional methods and AI-based tools.

### Procedure

In terms of procedure, the researcher used an 8-week intervention program. During this period, the experimental group used Duolingo for 30 minutes to learn the English language, which was carried out three times a week. The researcher ensured that each lesson was designed to focus on reading comprehension, vocabulary, and grammar skills. In contrast, the control group attended English language classes in line with a lesson plan and standard curriculum. Pre-tests and post-tests were used for data collection, through which the language proficiency of participants was assessed using a standardized CEFR-based test. In addition, surveys were used to obtain feedback and perceptions from participants regarding whether AI-based tools or traditional methods are effective in philological education. The consent of the participants was obtained before the commencement of the study, ensuring they understood the risks, benefits, and purpose of the study. The experimental group engaged in self-directed learning with Duolingo, while the control group participated in traditional teacher-led classes. Anonymity and confidentiality of the participants were given high consideration in this research, and the study adhered to the regulations and guidelines set forth by the relevant Ukrainian research ethics committee.

### Data Analysis

In this research, different statistical methods were used to compare the motivation and language proficiency of participants in the control and experimental groups. An independent t-test was used by the researcher to compare the mean scores of the experimental and control groups on the pre and post-test. This allowed the researcher to determine the differences in language proficiency. In addition, an Analysis of Variance (ANOVA) was conducted to determine the interaction between group and time, enabling the researcher to determine if the AI-based tool had a significant effect on language proficiency over time. Through this, the researcher was able to ascertain the effectiveness of the traditional method Versus AI-based tools for the purpose of making comparisons. Very importantly, inferential and descriptive statistics were also used to analyze the survey information obtained for the attitudes and perceptions of the study participants in English language learning. Through these statistical methods, meaningful conclusions about the effectiveness of AI-based tools were drawn in language learning.

## 4. Results

The results in Table 2 show that both the control group and experimental control group demonstrated improvement in language proficiency from pre-test to post-test. However, the experimental group indicated greater improvement in the proficiency of English language compared to the control group. The independent t-test analysis showed that a significant difference between the two groups, indicating that the experimental intervention had a positive effect on language proficiency.

**Table 2.** Comparative analysis of pre-test and post-test scores in English and Ukraine languages proficiency

| Group | No. | Pre-Test Mean | SD | Post-Test Mean | SD | T | P | Cohen's d |
|---|---|---|---|---|---|---|---|---|
| **Experimental** | 50 | 55.32 | 10.23 | 75.12 | 8.56 | 9.56 | <0.001 | 1.23 |
| **Control** | 50 | 54.91 | 9.87 | 65.45 | 9.32 | 6.23 | <0.001 | 0.87 |

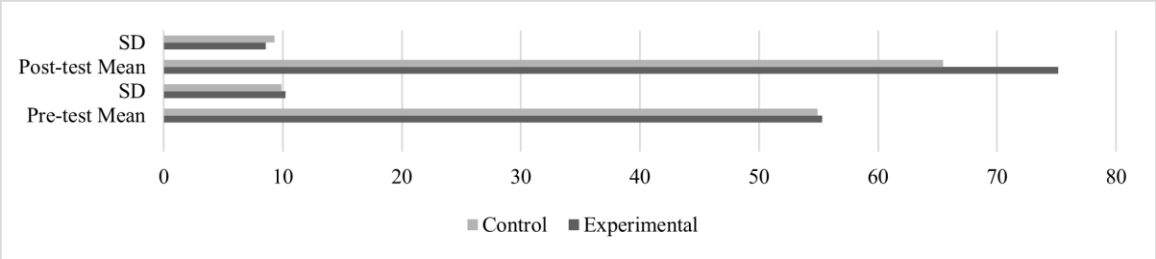


**Figure 1.** Pre-test and post-test score in English and Ukraine language proficiency

Figure 1 illustrates the pre-test and post-test scores of the experimental and control groups, revealing the improvement in English language proficiency among students using AI-based tools.

**Table 3**. Comparative analysis of levels of motivation using one way ANOVA

| Group | No. | Mean | SD | F | P | $\eta^2$ |
|---|---|---|---|---|---|---|
| **Experimental** | 50 | 4.23 | 0.75 | 6.45 | 0.013 | 0.06 |
| **Control** | 50 | 3.56 | 0.89 | | | |

The findings in Table 3 show a significant difference in motivation between the experimental group and the control group, the result means that the experimental group had higher levels of motivation than the control group. This simply means that the use of AI-based tools enhances learners' motivation as well as engagement in language learning.


**Figure 2.** One-way ANOVA for students' motivation

Figure 2 presents the results of the one-way ANOVA analysis, demonstrating the significant difference in motivational scores between the experimental and control groups.

**Table 4.** Challenges and limitations associated with AI-based tools

| Theme | Frequency | Percentage |
|---|---|---|
| Technical Issues | 20 | 40 |
| Limited feedback | 15 | 30 |
| Lack of human interaction | 12 | 24 |
| Insufficient training | 10 | 20 |
| Order | 3 | 6 |

Data in Table 4 revealed some problems affecting the integration and effectiveness of AI-based tools that need to be addressed to enhance language learning. The most critical problem is technical issues, which was rated 40% by participants, followed by limited feedback (30%), lack of human interaction (24%), and insufficient training (20%). Therefore, it shows that technical issues, limited feedback, and lack of human interaction were the most serious problems affecting the effectiveness of AI-based tools in language learning.

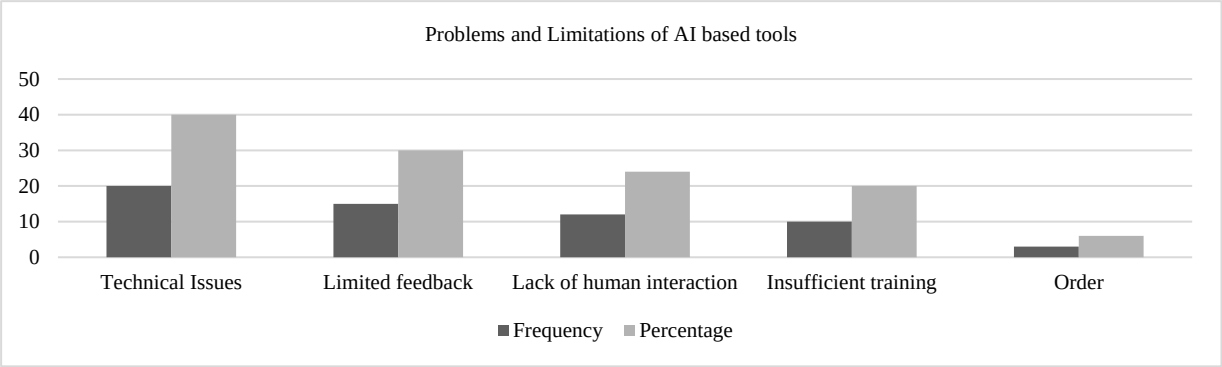


**Figure 3.** Challenges and limitations of AI-based tools in language learning

Figure 3 above shows the challenges and limitations of using AI-based tools in language learning, providing insights into potential areas for improvement and development.

**Table 5.** Test of hypothesis 1

| Group | No. | Mean | SD | T | P | Cohen's d |
|---|---|---|---|---|---|---|
| **Experimental** | 50 | 75.12 | 8.56 | 4.23 | <0.001 | 0.73 |
| **Control** | 50 | 65.45 | 9.32 | 5.40 | | |

Data analyzed in Table 5 using independent t-test revealed that there is a significant difference between the experimental group and the control group. In the result obtained, the experimental group scored higher in English language proficiency than participants in the control group, hence, the hypothesis which states that students using an AI-based learning application will demonstrate significantly higher improvement in the proficiency of English and Ukraine Languages compared to those using traditional classroom method, was accepted.

**Table 6.** Test of hypothesis 2

| Group | No. | Mean | SD | T | P | Cohen's d |
|---|---|---|---|---|---|---|
| **Experimental** | 50 | 4.23 | 0.75 | 3.59 | <0.001 | 0.63 |
| **Control** | 50 | 3.56 | 0.89 | 4.07 | | |

The independent samples t-test indicated a significant difference in motivational scores between the experimental group and control group, with the experimental group achieving higher scores. The result of Table 6 supports the acceptance of the second hypothesis, which states that AI-based tools enhance student motivation and engagement in language learning compared with traditional methods. Based on these findings, the researcher recommend that teachers and educational policymakers incorporate AI-based tools into language education programs to strengthen student motivation and language proficiency. Such integration can foster a more effective and personalized learning environment that promotes student engagement and improves language learning outcomes.

## 5. Discussion

The study's findings, in line with the first research question, show that using AI-based tools improves language proficiency in both English and Ukrainian. This is evident in the experimental group's high language proficiency scores compared to their colleagues in traditional classroom settings. This result is established because of the interactive and personalized nature of AI-based tools, which provide students with opportunities to learn at their convenience and receive immediate feedback. The technology used in the application may help students identify areas where improvement is needed for effectiveness and efficiency in the learning process. To support these findings, Arystanbayeva (2024) found that AI-powered platforms enhance the effectiveness of language learning

by providing real-time feedback and adaptive learning experiences. This result aligns with the findings of Tsekhmister et al. (2023), who argued that AI-based tools enhance language proficiency in the context of international education. In addition, there is a need for teacher training programs to focus on developing teacher skills so that they can be more effective in supporting language instruction using AI-based tools. If this is achieved, students will be prepared to address the complex challenges of the 21st century and also enhance the quality of language education in state universities in Ukraine. It is also essential to clearly state the limitations of the study. One of the significant limitations of this research is the sample size, as the 100 participants may not be representative of the entire population of students studying philological education in Ukraine. In addition, the short intervention period may have limited the thorough evaluation of the effectiveness of AI-based tools compared to traditional teaching methods. Furthermore, inadequate access to technology, such as internet devices and connectivity, may have impacted the study's results, potentially masking the full effects of the AI-based language learning application. To address these limitations, future research could focus on recruiting a larger and more diverse sample, extending the intervention duration, and incorporating multiple outcomes to capture the complexities of language learning. By doing so, this study will serve as baseline information for related studies. If AI-based tools must be integrated successfully into the study of philological education in Ukraine, there are some challenges that should be taken care of, and one of them is digital infrastructure; this is because some of the state universities in Ukraine may not have functional internet connectivity as expected to support learning using AI-based tools. In addition, the readiness of teachers to use AI-based tools is another problem, and some of them lack the skills for effective use of AI-based tools in their pedagogical practices.

The findings of this study, in accordance with the second research question, reveal that students in the experimental group exhibited higher motivational and engagement scores compared to those in the control group. This suggests that AI-based tools can lead to higher levels of motivation and engagement in language learning. The personalized and interactive nature of AI-based tools, along with instant feedback and autonomy, contributes to improved academic motivation and engagement. These findings are consistent with recent research, such as Egamkulova & Elmurodov (2025), PennState University Libraries (2021), and Varpanen et al. (2022), which highlight the benefits of AI-powered learning in promoting self-directed learning, academic engagement, and motivation. In Ukraine, integrating AI-based tools into language instruction can enhance academic engagement and motivation, particularly for students facing geographical barriers to high-quality language instruction. However, addressing technical issues, ensuring equal access to technology, and providing sufficient training and support are crucial to maximizing the benefits of AI-based tools. The results of this study also show that students in state universities in Ukraine can benefit from AI-based tools, leading to excellent academic performance in language learning. The study's findings on the third research question highlight key challenges in integrating AI-based tools into Ukraine's language education landscape. Notably, technical issues, limited feedback, inadequate digital infrastructure, insufficient training and support, and lack of human interaction were identified as significant limitations. Among these, lack of human interaction emerged as a particularly critical concern, underscoring the need for a balanced approach that incorporates the benefits of AI-based tools with the value of human interaction in language learning. These findings emphasizing the need for robust technical support and teacher training to ensure the effective integration of AI-based tools. Similarly, Bobrikova et al. (2023) argued that teacher training programs facilitate the integration of AI-based tools and other innovative technologies in language education.

For policymakers, the findings suggest that investing in digital infrastructure and teacher training programs is crucial to supporting the effective use of AI-based tools in language education. To educators, the findings highlight the importance of developing targeted training programs that focus on practical applications and pedagogical integration. For curriculum designers, the findings suggest that AI-based tools can be used to enhance existing curricula and learning outcomes. It is, however, important to note that these challenges need to be addressed more, particularly in the context of Ukraine, which will require the intervention of technologists, educational policymakers, and teachers to work collectively in mapping out approaches that will create a conducive environment for effective integration of technologies into philological education. To achieve this is dependent on effective implementation, evaluation, and careful planning.

## 6. Conclusions

This research examined the effectiveness of AI-based tools in enhancing language proficiency and motivational levels in both English and Ukrainian among philology students in Ukrainian state universities. The results revealed that the experimental group, which utilized AI-based tools, demonstrated higher scores in language proficiency and increased motivational and engagement levels compared to the control group. These results suggest that integrating AI-based tools into traditional teaching methods can create a more effective and personalized learning environment for philology students. The findings of this study have significant implications for language education in Ukraine. To achieve this, educators and policymakers should develop targeted teacher training programs that focus on practical applications and pedagogical integration for teaching both English and Ukrainian languages. Moreover, ensuring equal access to digital infrastructure is crucial to bridging the gap in digital literacy and

infrastructure. By integrating AI-based tools into existing curricula and outcomes for both languages, educators can maximize their effectiveness. Future studies can build upon this research by examining the long-term effects of AI-based tools on language learning outcomes and investigating the optimal ways to integrate these tools into language educational programs for both English and Ukrainian. By doing so, researchers can contribute to the development of more sustainable and effective language educational programs that cater to the needs of philology students in Ukraine. This study provides a foundation for further research and development in the field of philological education in Ukraine. Additionally, given the 8-week duration of the intervention, this relatively short period may not fully capture the long-term effects. Future studies should therefore consider extending the intervention period to better assess the sustainability of the results.

**Author Contributions**

Conceptualization, M.P. and O.Z.; Methodology, V.P.; Software, O.K.; Validation, N.H., O.Z. and V.P.; Formal Analysis, M.P.; Investigation, O.Z.; Data Curation, N.H.; Writing—Original Draft Preparation, V.P.; Writing—Review & Editing, O.K.; Visualization, N.H.; Supervision, M.P.; Project Administration, O.K.; Funding Acquisition, O.Z. Authors have read and agreed to the published version of the manuscript.

**Data Availability**

The data used to support the research findings are available from the corresponding author upon request.

**Conflicts of Interest**

The authors declare no conflict of interest.

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