International Journal of Basic and Applied Sciences, 14 (5) (2025) 879-890

International Journal of Basic and Applied Sciences

Website: www.sciencepubco.com/index.php/IJBAS
https://doi.org/10.14419/xganhc13
Research paper

The Use of Artificial Intelligence for Adaptive Learning of Future English Teachers

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Received: May 12, 2025, Accepted: September 15, 2025, Published: September 26, 2025

Abstract

The purpose of this study was to investigate the benefits of using adaptive approaches, including the integration of artificial intelligence technologies, in teaching English to students. Two AI-based applications were initially selected: Duolingo and Babbel, which are used to develop various aspects of language competence, including listening, reading, writing, and speaking. The study was conducted in Ukraine and covered universities from different cities; the names of the higher education institutions stayed anonymous. The total number of respondents was 126, divided into two groups: one that used AI-based applications for teaching, and the other that followed conventional methods. Before the study began, the Test of English as a Foreign Language (TOEFL) was administered to assess the participants' general language proficiency. According to the test results, the average score of the first group increased from 74 to 88 points, while the second group's score increased from 81 to 83 points. The greatest progress was noted in listening (from 16 to 22 points in the first group) and in writing (from 18 to 21 points). A paired t-test revealed significant improvement in the AI group ($p<0.05$), with effect sizes of Cohen's $d=0.8$ for listening and 0.5 for writing, signifying medium to large effects. The second group had diminished advancement in all skills. The results indicate that AI-powered platforms such as Duolingo and Babbel are efficacious instruments for enhancing language proficiency, particularly in listening and writing.

Keywords: *Educational Process; Innovative Educational Technologies; Neural Networks; Source Language; Target Language; Virtual Platforms; English Language Teacher Training.*

1. Introduction

Adaptive learning based on artificial intelligence (AI) involves the creation of individualised learning programmes that accommodate the needs, level of knowledge, and interests of each student. This improves the efficiency of learning and stimulates the development of language skills more conveniently and flexibly. The use of neural networks (mathematical models inspired by the human brain and used in the field of AI to process and analyse data) in education opens new opportunities to improve the quality of education and professional training of future English teachers. Integrating AI into the learning process helps automate routine teacher tasks, such as checking papers or tracking student progress, freeing up time for deeper interaction with the material and personal development of future teachers (Karataş et al., 2024; Kumar, 2023). AI-powered systems can also provide access to modern teaching methods and help develop individual learning strategies. Furthermore, AI contributes to the development of interactive educational platforms where future teachers can practice teaching English in a real-life environment. Despite the considerable potential of AI to automate routine tasks and improve the learning process, questions arise regarding the effectiveness of integrating these technologies into the training of future teachers. The impact of AI on the development of student teachers' professional competences, adaptation to modern teaching requirements, and the development of individual learning strategies are still understudied. It is necessary to investigate how AI can be optimally used to support the personal and professional development of future teachers in a globalised world. Nonetheless, whereas AI's potential in wider educational contexts is widely established, its use in teacher training, particularly for prospective English language educators, remains insufficiently examined.

Despite the potential applications of AI in education, the incorporation of AI-driven adaptive learning technologies into teacher professional development remains an underexplored domain. The majority of current research concentrates on the role of AI in general educational settings, which includes enhancing language acquisition, promoting personalised learning, and automating administrative functions. Nonetheless, there is a notable deficiency of research examining the specific application of AI in adaptive learning within teacher training,

especially for English language educators. This gap underscores the originality and importance of this research, which investigates the use of AI-based platforms, Duolingo and Babbel, as instruments for adaptive learning in teacher training programmes.

Duolingo and Babbel were selected for this study due to their extensive utilisation, accessibility, and AI-driven adaptive learning capabilities, rendering them optimal platforms for improving language proficiency in prospective educators. Duolingo's gamified methodology and individualised learning paths make it stimulating and effective for developing fundamental language competencies, whereas Babbel provides systematic lessons that prioritise practical conversational skills and grammar, essential for teacher training. Both platforms employ AI to modify the learning experience according to individual progress, delivering real-time feedback and targeted exercises, thereby creating a dynamic and customised learning environment crucial for cultivating the language proficiency and pedagogical adaptability required by future educators.

In the context of considering the role of AI as a potential competitor for teachers, Dilmurod & Fazliddin (2021) and Sultangazina et al. (2021). Popova (2024) conducted a comprehensive study of this issue and concluded that AI should not be considered a competitor for teachers. On the contrary, it is an effective tool that complements the work of teachers. Specifically, the researchers emphasised that AI technologies actively contribute to the creation of personalised learning strategies and the introduction of digital laboratories that enable more flexible educational experiments. Studying the use of automated assessment systems, Slimi (2021), Akgun & Greenhow (2021) focused their research on the effectiveness of platforms such as Coursera and EdX in the context of assessing students' written work. According to their findings, these platforms enable significant scaling of the assessment process through automation, as well as provide detailed feedback that facilitates teachers' routine work and improves the quality of the educational process in educational institutions.

Considering the effects of the latest educational technologies on the personalisation of the learning process, Suryanti et al. (2024) and Zhou (2024) found that AI can adapt education to the individual needs of each student. Their study revealed that modern intelligent learning systems enable real-time analysis of students' academic achievements, providing personalised recommendations and feedback, which helps to effectively bridge knowledge gaps. Furthermore, the use of big data allows AI to predict the most suitable learning materials for each student, which greatly increases the efficiency of the learning process. In terms of the widespread integration of AI into educational institutions, Chen et al. (2020) investigated the use of AI to automate educational and administrative processes. Their findings revealed a significant increase in the efficiency of grading student work due to the speed and accuracy provided by AI. They also emphasised that the adaptation of learning materials to individual student needs using AI increases their motivation and improves their learning.

Analysing the issue of improving the overall effectiveness of learning through the introduction of AI, González-Calatayud et al. (2021), Bond et al. (2024), and Androshchuk & Maliuga (2024) investigated how AI promotes more active student participation in learning and helps teachers develop more effective teaching and assessment strategies. They found that automating administrative tasks with AI makes teachers' work easier, and real-time feedback makes the learning process more tailored to the needs of each student. However, the researchers also emphasised the significance of addressing ethical issues, such as privacy and avoiding bias, which are key challenges in the application of AI in education.

Although it is well-documented that AI enhances learning and fosters language skills in diverse educational settings, a notable deficiency exists in the literature about its implementation in the adaptive learning of prospective educators. Although numerous studies have investigated AI's efficacy in general educational contexts, particularly in improving language skills, there is a shortage of research specifically addressing how AI-driven platforms can cater to the adaptive learning requirements of teacher trainees, particularly future English language teachers. This gap highlights the originality of the present work, which specifically investigates how AI-driven platforms such as Duolingo and Babbel might be utilised to customise language learning and improve pedagogical competencies in teacher training. This research explores an unexplored area, enhancing the existing information on AI in education and providing novel insights into its capacity to transform teacher preparation programmes.

This research aims to fill these gaps by examining the efficacy of AI-driven platforms such as Duolingo and Babbel in adaptive learning for prospective English educators. The study specifically examines how these platforms might be employed to improve language proficiency and pedagogical expertise, delivering a tailored learning experience that traditional techniques may not fully provide. The purpose of this study was to determine the effectiveness of using AI to develop adaptive learning strategies that would contribute to the professional development of future English teachers. To fulfil this purpose, the following tasks were set:

1. To identify the advantages and disadvantages of using AI in teacher training programmes, emphasising language competency and pedagogical advancement for prospective English educators.
2. To evaluate the effectiveness of current AI-driven English language learning systems, including Duolingo and Babbel, in promoting adaptive learning for prospective educators and enhancing their professional skills.
3. To conduct a comparative examination of the effectiveness of traditional teaching techniques as opposed to AI-driven adaptive learning tools (Duolingo and Babbel) regarding language competency, engagement, and pedagogical skill enhancement in teacher education.

The research hypotheses were established:

- Hypothesis 1: AI-driven platforms, such as Duolingo and Babbel, will markedly enhance the language proficiency (listening, speaking, reading, and writing skills) of prospective English educators in comparison to traditional teaching methodologies.
- Hypothesis 2: The use of AI-driven adaptive learning platforms will improve the pedagogical abilities and professional capabilities of prospective English educators by offering personalised, real-time feedback and tailored learning pathways.
- Hypothesis 3: Future English educators utilising AI-driven platforms (Duolingo and Babbel) will exhibit greater motivation and involvement in language acquisition than those adhering to traditional pedagogical techniques, attributable to the personalised and interactive characteristics of the AI tools.
- Hypothesis 4: The incorporation of AI into teacher training programmes will pose distinct obstacles, including concerns over data privacy, reliance on technology, and the equilibrium between AI and human involvement in the educational process, potentially impacting the overall efficacy of the platforms.

2. Literature Review

2.1 AI **for Personalized Learning**

AI is an umbrella term that encompasses a wide range of specialised fields focused on the development of algorithms and systems designed to replicate or simulate human cognitive abilities. These systems are aimed at creating technologies that can perform tasks that conventionally require human intelligence, such as learning, problem solving, reasoning, and decision-making. Drawing on technologies from fields such as machine learning, natural language processing, computer vision, and robotics, AI systems are evolving to address increasingly complex challenges in sectors ranging from healthcare and finance to autonomous vehicles and personal assistants (Mutasa et al. 2020).

Automated assessment systems, although not universally categorised as traditional AI, are based on AI principles, including machine learning, natural language processing, and data analytics. These systems employ algorithms to assess student performance, deliver immediate feedback, and monitor development in a manner that simulates human cognitive functions. They are intended to evaluate responses or assignments according to established criteria, modifying their feedback in accordance with the student's performance and learning trajectory. For example, in language learning platforms such as Duolingo and Babbel, automated assessment systems offer immediate corrections for grammar errors, pronunciation, and writing structure, facilitating dynamic evaluation based on real-time data. In this context, these systems are classified as AI due to their utilisation of learnt patterns from extensive datasets, processing of natural language, and provision of tailored evaluations to students.

Another approach defines an artificial neural network as a machine or as the ability of a computer system to reproduce or perform certain functions. Speech and image recognition, decision-making, and complex problem-solving are part of these tasks. AI systems can mimic human thought processes by using algorithms and large amounts of data to process data, learn from experience, and change behaviour (Lukash et al. 2025, Ma et al. 2024). This technology is increasingly being used in areas ranging from medical diagnostics to autonomous vehicles, transforming industries, and changing the way humans interact with machines (Triansyah et al. 2023).

In the field of communication studies, AI is defined as the practical ability of artificial mechanisms to perform tasks, solve problems, communicate, interact, and reason in the way that humans do. This definition addresses things like performance and autonomy and explains how AI systems can operate independently or under varying degrees of human supervision. AI is a branch of computer science that is concerned with creating systems that can perform tasks that would normally require human intelligence (Riznyk & Riznyk, 2024; Tukhtarova et al., 2021). This can be achieved by analysing various approaches. AI analyses and uses data for decision-making, problem-solving, learning, natural language processing, and other intelligent activities, as well as for speech and image recognition (de Zúñiga et al. 2023).

2.2.1 AI in Language Education and Adaptive Learning

Social robots and other AI-based systems can act as learning assistants, creating an environment where students can learn in an interactive and motivating way. They can mimic the role of a teacher by performing tasks such as checking homework, organising individual study sessions, and providing recommendations to improve student performance. This reduces the workload of teachers, enabling them to focus on more complex pedagogical tasks, such as fostering critical thinking and developing creative skills. Furthermore, AI enables the development of smart learning platforms capable of not only adapting learning to students' needs, but also analysing their achievements, identifying weaknesses, and providing individualised recommendations. This contributes to the creation of dynamic learning environments that enable rapid adaptation to changes, such as distance learning, which has become particularly relevant in the context of the COVID-19 pandemic. The use of such technologies makes the learning process more flexible and accessible to students of various categories, which enables an increase in educational coverage and reduces inequalities in access to quality education (Ahmad et al. 2021, Guliyeva & Azizova 2022).

However, despite the considerable benefits, the need for deeper pedagogical integration of these technologies persists. Teachers and administrators often face difficulties in implementing the latest technologies due to a lack of clear understanding of their pedagogical value (Issakova et al. 2023, Zhou et al. 2024). There is a need to develop new methodologies and models that would enable AI to be integrated into the learning process in a way that effectively complements traditional teaching methods rather than simply automates them. Furthermore, ethical issues related to ensuring the confidentiality of student data, transparency of algorithms, and avoiding bias in automated assessment systems are a crucial aspect of AI in higher education. The use of large data sets to analyse learning activities raises questions about the protection of students' personal information and responsibility for errors in automated systems (Bulharu & Dziatko, 2022; Zawacki-Richter et al., 2019).

ChatGPT (an AI system developed by OpenAI, a company specialising in natural language processing and generation), according to Zhang (2024), has become a popular tool for increasing student engagement and developing writing skills in English as a Foreign Language (EFL) classrooms. It enables students to interact conversationally, providing instant feedback and fostering a more engaging learning environment. Studies showed that students who use ChatGPT report improved writing efficiency and quality, as well as a positive attitude towards the use of AI in the learning process. Lingle is an AI-driven application aimed at improving students' reading and writing abilities in English as EFL settings. It employs interactive exercises, immediate feedback, and customised learning trajectories to engage students and enhance their language competence (Issakova et al. 2021, Sadirbekova et al. 2024). A case study found that using Lingle tools significantly improved student engagement and language proficiency, especially in reading and writing tasks (Hsiao & Chang, 2023).

AIPengTalk is an AI-based tool focused on teaching sentence construction to younger students. It uses a structured approach to improve English sentence construction skills through task-based learning. This tool has been shown to be effective for varying levels of language proficiency, especially for low-achieving students (Lee and Lee, 2024). Another platform that was reviewed was Classtime.com, which is an online AI-powered testing platform that provides instant feedback on grades, making it particularly useful for teaching English for Specific Purposes (ESP). This platform enables teachers to effectively analyse student performance and tailor teaching to meet individual learning needs (Dubovyk 2024, Ningsih 2023).

2.2.2 AI in Teacher Training

The study by Lin et al. (2023) on AI algorithms in education analysed key approaches that can transform the learning process, including intelligent learning systems and adaptive learning models. Intelligent learning systems leverage AI algorithms to provide learners with personalised recommendations and real-time feedback, enabling them to adjust their learning process to address identified knowledge gaps. These systems are particularly effective in language and maths learning, where they help learners master complex concepts through automated training exercises and error correction. Adaptive learning models use machine learning algorithms to analyse student learning data to create individualised learning paths (Tsurkan-Saifulina & Stupak, 2022; Nurgaliyeva et al., 2025). This contributes to a better understanding of the material by providing learners with access to content that meets their individual needs and learning pace. While great advances were made, the study also noted that challenges still exist in integrating these systems, especially in handling unstructured data and ensuring effective interaction between people and technology.

Kavitha et al. (2023) examined the introduction of AI tools in education, focusing on their effects on teaching, learning, and student support. The rapid development of computing technologies contributed to the widespread adoption of AI in the educational environment. Specifically, the use of AI in education includes the development of digital learning platforms that provide efficient management of learning resources, automated knowledge assessment, and online student support. AI enables the creation of adaptive systems that provide students with instant feedback and analyse their progress, which contributes to better interaction between the teacher and the student (Diachuk 2024). This contributes to improving the learning process in the context of digitalisation of education, as it allows for greater flexibility

and access to learning resources. At the same time, the study pointed to the need to integrate AI-enabled teaching methods to maximise the effect of its use in education.

Due to AI capabilities, higher education institutions can manage the learning process more efficiently by automating some of the administrative tasks, such as checking assignments, grading, and providing feedback (Ocen et al. 2025). This helps teachers to focus more on creating high-quality learning content and providing individual support to students. Intelligent learning platforms also contribute to a more flexible and rapid adaptation of the educational process to the needs of the labour market, providing students with skills that are in demand in the modern economy. Table 1 summarises the reviewed studies on the application of AI in education, outlining the techniques and principal findings.

Table 1: Summary of key studies on AI in education

Study	Methodology	Key findings
Mutasa et al. (2020)	Clinical study	Investigates overfitting in AI-based radiology studies. Highlights the risk of overfitting in AI models and the need for robust validation in medical applications.
Triansyah et al. (2023)	Bibliometric analysis	Provides a comprehensive review of AI in high school education, identifying key trends, challenges, and areas for further research in AI adoption.
de Zúñiga et al. (2023)	Scholarly definition	Explores the conceptual framework of AI in communication studies, emphasizing its ability to replicate human cognitive functions and its growing impact across industries.
Ahmad et al. (2021)	Literature review	Discusses the role of AI in education, focusing on personalized learning, AI's potential to enhance teaching, and its integration into digital learning platforms.
Zawacki-Richter et al. (2019)	Systematic review	Reviews AI applications in higher education, identifying gaps and the need for more educator involvement in AI integration for enhanced learning outcomes.
Zhang (2024)	Case study	Examines the use of ChatGPT in enhancing learner agency and multilingual practices in English writing classes. Shows improvements in writing efficiency and student engagement.
Hsiao and Chang (2023)	Course evaluation	Evaluates the effectiveness of AI-powered tools in enhancing EFL reading and writing skills, demonstrating increased student engagement and proficiency.
Lee and Lee (2024)	Experimental study	Investigates the use of AI for teaching elementary school students sentence construction. Found significant improvements in language skills, particularly in sentence structure.
Ningsih (2023)	Testing platform analysis	Analyzes the effectiveness of Classtime.com as an AI-based testing platform for English for specific purposes students, noting its benefits in real-time feedback and performance analysis.
Lin et al. (2023)	Experimental study	Investigates the application of AI algorithms in education. Found that AI can significantly enhance personalized learning experiences and offer adaptive learning paths for students.
Kavitha et al. (2023)	Case study	Examines the implementation of AI in education, highlighting the role of AI in improving teaching quality, learning engagement, and administrative tasks in educational settings.

It is essential to address the limits of existing AI tools in education. Initially, AI technologies frequently exhibit a deficiency in tailored input. Although they present adaptive learning pathways, they may lack profound, personalised insights customised to each student's unique requirements, hence constraining their efficacy. Secondly, AI systems may unintentionally mirror biases inherent in their training data, resulting in potentially biased feedback or reactions. Ultimately, human supervision is essential. AI can automate tasks (Orazbayev et al. 2023). Nevertheless, it cannot entirely supplant the judgment, emotional intelligence, and personalised support that teachers offer.

It is crucial to expand on the ethical implications of AI in education, specifically regarding data privacy, algorithmic prejudice, and the effects on the responsibilities of educators. AI systems aggregate extensive student data to personalise educational experiences, prompting apprehensions regarding data security and privacy. Moreover, algorithmic bias constitutes a critical concern, since AI technologies may perpetuate prevailing assumptions or biases. Ultimately, the function of educators may transition from direct instruction to a more technical support capacity, diminishing their capacity to connect with pupils on a profound emotional or social level. This transition may influence the teacher-student relationship and the standard of education.

Artificial intelligence in education has substantial benefits, such as personalised learning trajectories tailored to students' capabilities, learning velocities, and deficiencies, hence improving efficiency and engagement through interactive instruments like virtual assistants and adaptive assessments (Bilad et al. 2023, Nasir et al. 2024). AI enhances writing proficiency by examining text structure, vocabulary, and grammar, while also promoting critical thinking (AlAli & Wardat, 2024; Bilad et al., 2023). Furthermore, AI enhances administrative efficiency, enabling universities to streamline operations and minimise time allocated to mundane chores, while cognitive tutors and intelligent systems elevate student performance via adaptive learning techniques (Mishra & Srivastava, 2024). Nonetheless, the incorporation of AI has obstacles, such as the possible decline in human interaction, which may impede the development of social skills, as well as the substantial expenses associated with maintenance and upgrades (Al-Tkhayneh et al. 2023). Moreover, over-reliance on AI may diminish teachers' pedagogical competencies and emotional connections with pupils, impairing their capacity to cultivate critical thinking and interpersonal involvement (Borisov & Stoyanova, 2024). Consequently, although AI provides personalised and adaptable learning, its efficacy depends on harmonising technological integration with conventional approaches and preserving human connection and ethical principles.

The study seeks to evaluate Hypothesis 1 by comparing the effectiveness of AI-driven platforms, Duolingo and Babbel, in improving the language proficiency (listening, speaking, reading, and writing skills) of aspiring English educators, in contrast to conventional teaching techniques. This study assesses Hypothesis 2 by examining the role of these platforms in enhancing pedagogical skills, with an emphasis on the personalised feedback and adaptive learning pathways provided by AI. Hypothesis 3 investigates the influence of AI-based platforms on student motivation and engagement in language acquisition by comparing the frequency and intensity of learning activities across those utilising AI platforms and those employing traditional techniques. Finally, the study examines Hypothesis 4 by analysing the difficulties of incorporating AI into teacher training, specifically addressing issues of data privacy, reliance on technology, and the equilibrium between AI and human supervision in education.

3. Materials and Methods

At the beginning of the study, students from various higher education institutions (HEIs) in Ukraine from different cities (Kyiv, Lviv, Odesa, Kharkiv, Vinnytsia, Sumy, Kherson, and Zhytomyr) were selected. Universities were chosen to reflect geographic diversity throughout Ukraine, guaranteeing representation of both urban and regional students. The institutions were analogous for their English language programs, each providing a standardised curriculum consistent with the Common European Framework of Reference (CEFR). This selection guaranteed that the students possessed comparable foundational exposure to English, hence enhancing the generalisability of the

study's findings throughout Ukraine's higher education sector. When agreeing on the terms of cooperation, the heads of the higher education institutions expressed a desire to keep the concrete institutions anonymous.

Recruitment was executed by direct emails to students enrolled in English Language and Literature programmes at affiliated universities. Students expressing interest were instructed to complete a Google Form providing their demographic information and consent to participate. No financial incentives were offered; rather, participants received a certificate of participation that might serve as a credential for their academic portfolio. Furthermore, participants in the AI group were afforded prolonged access to the platforms (Duolingo and Babbel) following the study's conclusion. The students were required to meet several criteria: they had to be in the 3rd or 4th year of their bachelor's degree, their field of study needed to be 01 Education/Pedagogy, their specialisation had to be 014.021 Secondary Education (English Language and Literature), and their English language proficiency had to be at least A2. The study was conducted over a total duration of 16 weeks, equivalent to one academic semester, from January 2024 to June 2024. To participate in the online study, individuals were required to complete Google Forms, providing details about their age, gender, English language level, and a photograph of their student ID card, which verified their status as 3rd- or 4th-year students in their respective degree programmes. Additionally, participants were asked to include their contact information for future communication.

All participants who met the criteria were sent a link to take a test to objectively assess their English proficiency. For this purpose, the Test of English as a Foreign Language (TOEFL) Internet-Based Test (iBT) was chosen because it is a proven test aimed specifically at people whose native language is not English (TOEFL iBT Test... 2024). The test consists of four main sections: reading, listening, speaking, and writing, for each of which the respondent could get from 0-30, with a total score of 0-120. The average total duration of the test was 4 hours. Specifically, the first section, reading, consisted of 36-56 questions and lasted no longer than 80 minutes. The second section was the listening section, which consisted of 34-51 questions and lasted no longer than 90 minutes, followed by a 10-minute break. Next, the speaking section was tested, which took 20 minutes and included 6 tasks, and the last section was writing, which took 50 minutes and included 2 tasks. The TOEFL iBT test possesses established validity, supported by robust research indicating its efficacy in predicting academic success for non-native speakers. Its reliability has been evaluated across many educational contexts, demonstrating robust internal consistency for each section. This study found that the reliability coefficient for the overall TOEFL score was above 0.90, validating the test's appropriateness for monitoring language development in higher education.

Subsequently, having compared various platforms offering AI-based English language learning, the 2 most suitable for the study were selected. Specifically, Duolingo was chosen because it offers a variety of written exercises and dictations, but the development of speaking skills gets much less attention. The programme is built in the form of a game process, where users gradually move through a skill tree. Furthermore, Duolingo has a special vocabulary section for practising the newly learnt words. As users learn, they accumulate "experience points" (an internal currency), for instance, for completing each lesson. Each skill is considered mastered after completing all the related lessons. The second platform was Babbel, which offers structured lessons focused on the practical application of the language in real-life situations. It employs a methodology aimed at developing both language and grammar skills, with an emphasis on conversational practice. Babbel lessons are adapted to the user's level, covering aspects such as listening, reading, writing, and speaking, with gradual progression of material. The platform also provides interactive exercises and dialogues to reinforce knowledge, making the learning process more personalised and effective.

This research utilised a randomised controlled trial (RCT) design, with participants assigned at random to either the AI-based learning group (Duolingo and Babbel) or the traditional methods group. The free versions of Duolingo and Babbel were used in the study, ensuring accessibility for all participants without the need for additional costs. The usage was observed through integrated tracking functionalities in both Duolingo and Babbel, which documented the frequency and duration of each participant's sessions. Furthermore, participants were requested to fill out a questionnaire at the midpoint of the study to self-assess their engagement and the frequency of their platform usage. After careful selection of participants, a total sample of 126 people living in Ukraine was selected. Participants ranged in age from 20 to 24 years, with an approximately equal gender distribution (50% male, 50% female). To achieve the objectives of the study, the sample was then evenly divided into two groups of 63 people each. Random assignment was executed using a computer-generated random number table. Before the study commenced, participants filled out a demographic survey to confirm that there were no significant pre-existing differences between the two groups for age, gender, and baseline TOEFL scores.

The first group included people who used AI-based technologies for learning, while the second group continued to learn English using the methods they were already familiar with. Both groups were assessed using a pre-test (TOEFL iBT) and a post-test at the end of the 16-week study period. After 8 weeks of the study, respondents were asked to fill out a questionnaire where participants in the first group evaluated the effectiveness of Duolingo and Babbel. The questions included the following:

1. Is the Duolingo/Babbel learning format convenient for you?
2. Do you think Duolingo/Babbel offers enough practice to improve your spoken English?
3. Do you feel that Duolingo/Babbel is an effective way to improve your language skills overall?
4. Do you think Duolingo/Babbel offers enough practice to improve your English grammar?
5. Do you think Duolingo/Babbel offers enough practice to improve your English reading skills?
6. Do you think Duolingo/Babbel offers enough listening exercises?

The possible answers included options "Yes," "Difficult to answer," and "No." The questionnaire is reliable due to its clear, consistent questions and response options. However, its validity may be limited by the narrow focus on subjective assessments and the limited response options, which may not capture the full complexity of participants' experiences with the platforms. No additional instruments, such as observational tools or third-party assessments, were used.

In the last step, the subjects were sent the same test they had taken at the beginning of the study to diagnose their level of proficiency in the other language. Subsequently, the findings were compared, processed, and conclusions were drawn about the feasibility of introducing AI into adaptive learning for future English teachers. The results were analysed using paired t-tests to assess the variations in TOEFL scores between the two groups, facilitating comparisons in language competencies (speaking, reading, listening, and writing). Furthermore, descriptive statistics were utilised to encapsulate the demographic attributes and self-reported utilisation of AI tools. Content analysis was employed to assess participant comments concerning the usability and efficacy of the platforms for qualitative insights.

The limitation of the study is that the sample was restricted to students from Ukrainian universities, potentially impacting the generalisability of the results, and only two AI platforms (Duolingo and Babbel) were analysed, omitting other possible tools that could provide varied learning experiences.

4. Results

The first stage of the empirical part of the study was the TOEFL (TOEFL iBT Test... 2024). The test was administered simultaneously to both groups of participants (the first group, which used the latest technologies, particularly Duolingo and Babbel, and the second group, which studied using conventional methods) before the introduction of any language learning programmes or applications. This helped to identify initial differences between the groups and provided a basis for further analysis of the effectiveness of the programmes. The mean results are presented in Fig. 1.

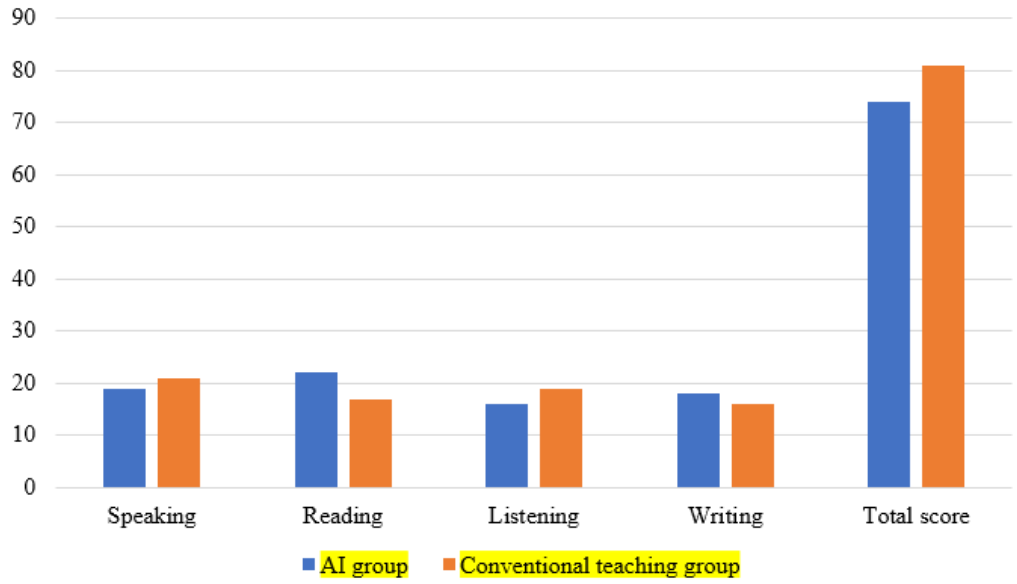

Fig. 1: Mean TOEFL test scores for the first and second groups before the study

Source: compiled by the authors.

Thus, the first group, which used AI-based applications, demonstrated intermediate scores in speaking, but their reading scores were upper-intermediate. Their listening scores were also intermediate, while their writing scores were slightly upper-intermediate. The second group, on the other hand, had upper-intermediate scores in speaking, but their reading level was at an intermediate level. At the same time, their listening was upper-intermediate, and their writing was intermediate. Overall, the average overall score of the second group was slightly greater than that of the first.

After 8 weeks of implementing the virtual learning tools for the first group, the respondents were asked to fill in a series of questions about their personal opinion on the introduction of Duolingo and Babbel into their study routine. The data on the subjective assessment of the usefulness of Duolingo are presented in Table 2.

Table 2: Average rating of the first group of respondents on the feasibility of implementing Duolingo

Question	Yes (%)	Difficult to answer (%)	No (%)
Is the Duolingo learning format convenient for you?	56 (88.9%)	5 (7.9%)	2 (3.2%)
Do you think Duolingo offers enough practice to improve your spoken English?	22 (34.9%)	3 (4.8%)	38 (60.3%)
Do you feel that Duolingo is an effective way to improve your language skills overall?	60 (95.2%)	0 (0%)	3 (4.8%)
Do you think Duolingo offers enough practice to improve your English grammar?	48 (76.2%)	9 (14.3%)	6 (9.5%)
Do you think Duolingo offers enough practice to improve your English reading skills?	31 (49.2%)	24 (38.1%)	8 (12.7%)
Do you think Duolingo offers enough listening exercises?	43 (68.3%)	11 (17.5%)	9 (14.3%)

Source: compiled by the authors.

Thus, 88.9% of respondents found the learning format convenient, which suggests that users are highly satisfied with the overall structure of Duolingo, its interface, and approach to learning. Also, 17.9% of respondents indicated “difficult to answer”, which may be related to the fact that they had not yet had sufficient experience of using the platform or had specific needs that were difficult to meet in the current format. Only 3.2% of respondents indicated that the learning format was inconvenient for them. This is a low figure, which suggests that the platform is generally successful and convenient for a wide range of users. As for the second question, only 34.9% of respondents thought that there were enough tasks to improve their speaking skills. This suggests that Duolingo does not fully meet the needs for speaking practice. A majority, 60.3%, of respondents disagreed with the statement that the platform offers enough practice to improve their English-speaking skills. This points to a key problem with Duolingo, which is the lack of tasks aimed at developing active language skills such as speaking. The study accounted for such risks by introducing the Babbel platform. A small proportion, 4.8% of respondents, found it difficult to answer, which may be related to their limited experience with the platform or other factors.

When asked about effectiveness, 95.2% of respondents said that Duolingo is effective for overall language improvement. This prominent level of support indicates that Duolingo is well-suited for comprehensive language development, including reading, listening, and grammar. Only 4.8% of respondents disagreed with this statement, indicating a small proportion of dissatisfied users. Regarding grammatical

exercises, 76.2% reported satisfaction with the quantity offered, while 14.3% were unsure and 9.5% disagreed, suggesting potential for improvement.

When asked whether Duolingo offered enough practice tasks to improve English reading skills, 49.2% agreed that Duolingo offers sufficient practice, while 38.1% were unsure, and 12.7% felt there were too few exercises. Concerning listening activities, 68.3% expressed satisfaction, 17.5% were ambivalent, and 14.3% reported dissatisfaction, suggesting a demand for increased diversity. Subsequently, the respondents were asked to answer the same questions but to evaluate the usefulness of the Babbel application. The mean data are presented in Table 3.

Table 3: The mean score of the first group of respondents on the feasibility of implementing Babbel

Question	Yes (%)	Difficult to answer (%)	No (%)
Is the Babbel learning format convenient for you?	60 (95.2%)	3 (4.8%)	0 (0%)
Do you think Babbel offers enough practice to improve your spoken English?	61 (96.8%)	0 (0%)	2 (3.2%)
Do you feel that Babbel is an effective way to improve your language skills overall?	57 (90.5%)	2 (3.2%)	4 (6.3%)
Do you think Babbel offers enough practice to improve your English grammar?	51 (81%)	3 (4.8%)	10 (15.9%)
Do you think Babbel offers enough practice to improve your English reading skills?	34 (54%)	10 (15.9%)	19 (30.2%)
Do you think Babbel offers enough listening exercises?	56 (88.9%)	2 (3.2%)	5 (7.9%)

Source: compiled by the authors.

It was found that 95.2% of respondents found the learning format comfortable. This suggests a prominent level of user satisfaction with the usability of Babbel. The platform is evidently adapted for diverse categories of users. A small percentage, 4.8%, of respondents were undecided. Perhaps they had not had enough experience yet or had special needs that may not be accommodated by the platform. To the second question, 6.8% of respondents indicated that Babbel provides a sufficient number of tasks to improve their spoken English. This is a remarkably high figure, which suggests that the platform is successful in this area and is probably explained by the application's narrow focus on this particular aspect. Only 3.2% of respondents disagreed, indicating a very small proportion of users looking for more opportunities to practice speaking. As for the effectiveness of the application for general language skills, 90.5% of respondents considered the Babbel to be effective for general language improvement, which suggests an elevated level of user satisfaction in various aspects of language learning. A minority, 3.2%, experienced difficulty in responding, potentially reflecting unfamiliarity with the platform or unaddressed personal requirements. Additionally, 6.3% expressed disagreement, indicating that certain users perceived the site as insufficient in facilitating their overall learning advancement.

The responses to the fourth question indicated that 81.0% of participants were content with the quantity of grammar tasks, suggesting a predominantly favourable learning experience for most users. Simultaneously, 4.8% of participants encountered difficulties in responding, indicating diverse experiences or restricted engagement with this facet of Babbel. Furthermore, 15.9% expressed disagreement, indicating the segment of respondents who felt the platform might enhance its grammar exercises. This distribution indicates a predominantly positive response to the grammar exercises, while recognising potential for improvement.

As for the effectiveness of reading development exercises, 54% of respondents found the number of reading development exercises to be sufficient, which indicates moderate support from users for this aspect of learning. A portion of respondents, 15.9%, found it difficult to answer, which may be related to individual needs. In addition, 30.2% of respondents disagreed that the platform offers enough reading exercises, indicating a weakness in the application. On the other hand, 88.9% of respondents agreed that Babbel offered enough listening exercises, indicating a high level of user satisfaction with this feature. A small percentage of respondents, specifically 3.2%, reported difficulty in answering. This finding may suggest a lack of practice in this area. Additionally, 7.9% of respondents expressed dissatisfaction with the number of listening exercises, indicating a potential need for greater variety or intensity in these tasks.

Next, respondents were asked about the frequency with which they learn English (time outside of their main studies was considered). At this stage, both the first group, i.e, the one that used the latest innovative technologies, and the second group, which studied using the conventional methods of learning, took part. The mean values of both groups are presented in Table 4.

Table 4: Mean frequency of English learning per week

Frequency	First group (n=63)	Second group (n=63)
Approximately 2 times a day for 2-3 hours/day	10 (16%)	18 (29%)
Approximately 4 times a day for 2-3 hours/day	28 (44%)	16 (25%)
Approximately 7 times a day for 2-3 hours/day	20 (32%)	14 (22%)
Approximately 2 times per week 1 hour/day or less	1 (2%)	2 (3%)
Approximately 4 times per week 1 hour/day or less	2 (3%)	5 (8%)
Approximately 7 times per week 1 hour/day or less	2 (3%)	8 (13%)

Source: compiled by the authors.

As presented in Table 4, in the first group, which used the latest innovative technologies, 16% of respondents studied English approximately 2 times a week, spending 2-3 hours each time. This suggests a moderate intensity of learning, which allows combining language learning with other activities or responsibilities. However, the largest number of respondents – 44% – studied English 4 times a week, spending 2-3 hours a day. This indicates a high level of motivation and a considerable amount of time the users are willing to invest in improving their language skills. Another 32% of respondents in the first group studied English every day, also for 2-3 hours a day, which indicates their constant involvement in the learning process and the high intensity of their classes. A small percentage of respondents in the first group had a less intensive study schedule. Only 2% of them studied English 2 times a week for 1 hour or less. Another 3% studied 4 times a week for 1 hour or less, and the same number, 3%, studied every day but spent less than 1 hour a day. This may indicate that some of the respondents were limited in time or used a less intensive approach to language learning.

In the second group, which studied using their usual methods of learning, slightly more respondents (compared to the first group) – 29% – studied English about 2 times a week for 2-3 hours a day. This suggests that conventional methods may be more convenient for those unable to study English more often. 25% of respondents in the second group studied 4 times a week for 2-3 hours a day, which is lower in intensity than in the first group. Another 22% of respondents studied English every day, spending 2-3 hours a day, which indicates a lower level of engagement in the language learning process compared to the first group. Less intensive approaches to learning were also found

in the second group. 3% of the respondents studied English about 2 times a week for 1 hour or less, another 8% studied 4 times a week for 1 hour or less, and 13% chose daily lessons lasting 1 hour or less.
Overall, comparing the two groups, the first group showed a slightly higher intensity of learning, especially among those who study 4 times a week, which may suggest that respondents found it easier to motivate themselves to study using applications than using classroom methods. The second group demonstrated a slightly more even distribution of study frequency across all options, with the most popular option among the second group being 2 times a week for 2-3 hours/day.
At the end of the study, after 16 weeks (or one academic semester), the participants were re-tested using the TOEFL, which was used at the beginning. The results of this test are presented in Fig. 2.

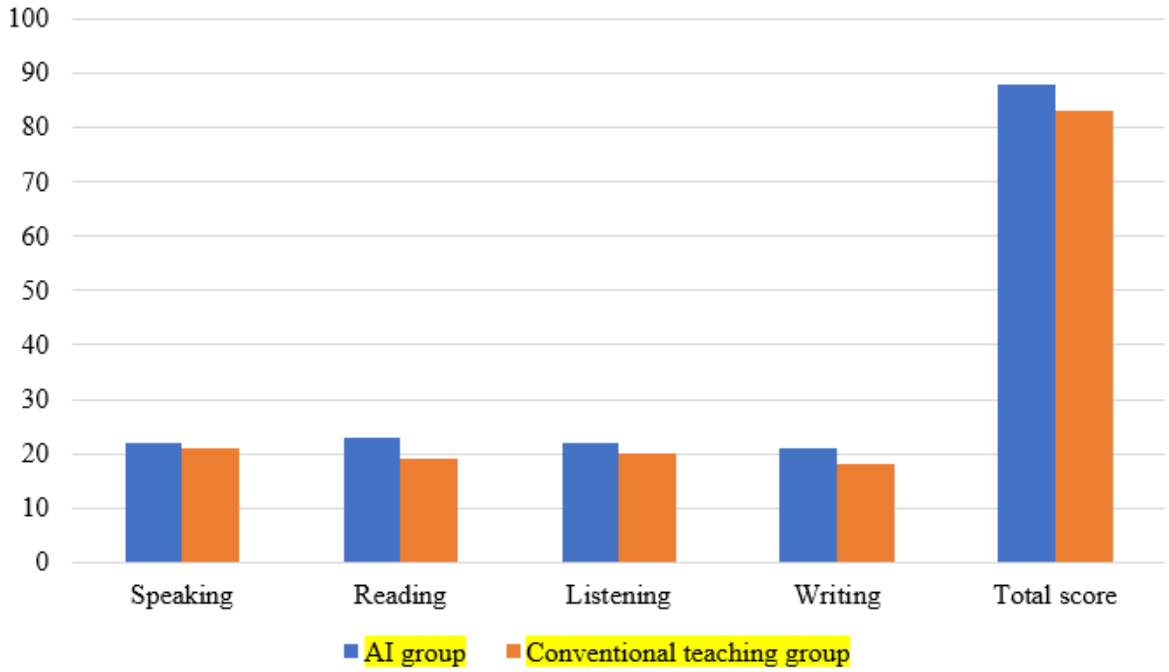

Fig. 2: Average TOEFL scores for the first and second groups after completion of the study

Source: compiled by the authors.

The first group (AI-based learning) demonstrated notable enhancements in their TOEFL scores across all linguistic competencies, particularly in hearing (6 points) and writing (3 points), with an overall score increase of 14 points. The observed benefits may be attributed to the increased study frequency in this group, where a greater proportion of respondents indicated studying 4-7 times weekly for 2-3 hours per session. In contrast, the second group (traditional instruction) had a lesser overall enhancement, with an increment of merely 2 points in their aggregate TOEFL scores. The study frequency distribution in this group exhibited greater variability, with a significant proportion of students engaging in study sessions of 2-4 times per week for shorter periods (1 hour or less), potentially accounting for the less pronounced gains observed in their scores. The AI group's increased study frequency correlates with their superior language competency, indicating that greater engagement with adaptive, AI-driven learning aids may improve overall language learning outcomes.
Notably, the AI group showed a substantial enhancement in their TEFL scores, increasing by 14 points, whilst the traditional group showed a mere improvement of 2 points. The difference is statistically significant, with a p-value below 0.05, indicating that the use of AI-driven platforms (Duolingo and Babbel) resulted in considerable enhancements in language proficiency. The AI group demonstrated the most significant advancement in listening abilities, with an increase of 6 points, and in writing skills, with an increase of 3 points. Conversely, the conventional group exhibited more moderate advancement in all competencies.
The second group also experienced changes. Specifically, the reading level increased by 2 points, reaching an upper-intermediate level. Speaking stayed unchanged both in terms of scores and level. Listening increased by 1 point, also staying at the upper-intermediate level. Writing improved by 2 points, rising to an upper-intermediate level. Although the overall average score of the second group did not show as much progress as the first group, it did increase by 2 points, which also suggests a certain progress in the group.
Overall, both groups performed better at the end of the study, but the first group, which used the latest technologies, showed more marked progress. Their speaking, reading, listening, and writing skills improved considerably, leading to a significant increase in their overall score. The second group, which was taught using conventional methods, also improved their scores, but not as much as the first group. Although their overall progress was less, it was still noticeable.

5. Discussion

The study supported the relevance of introducing AI-based applications into the education of future English teachers. Specifically, the respondents who studied with Duolingo and Babbel showed substantial improvements in their English language proficiency tests, particularly in the areas of speaking, reading, listening, and writing. These changes were more evident and more substantial than those of the respondents who studied using their conventional methods of learning English (the second group). Furthermore, the first group was asked to fill in a questionnaire about both applications and, despite some drawbacks related to distinct learning approaches and platform specialisation, most respondents expressed satisfaction with the tools, noting their effectiveness in various aspects of learning. It was also found that students who used AI applications spent more time studying than those in the second group, suggesting that they were more motivated to learn using such innovative technologies.

After evaluating the two English language learning platforms, it can be concluded that both have their strengths, but the effectiveness of their use varies depending on the aspect of learning. Duolingo demonstrated high usability and overall effectiveness for developing basic skills such as reading, grammar, and listening. However, the platform received heavy criticism for not providing enough tasks to improve spoken English, which is a crucial aspect for many users. Respondents noted that Duolingo is good for beginners, but not always effective for improving active language skills such as speaking. Babbel, on the other hand, showed better results in terms of practical tasks for spoken English. The platform also received high marks for its usability and ability to improve general language skills. Babbel performed particularly well in listening and speaking tasks, making it more effective for users looking to improve these particular aspects of the language. Thus, Duolingo is better suited for beginners or for improving passive skills (reading and listening), while Babbel is the best choice for those who want to actively develop their speaking and communication skills.

In the current study, considerable progress was made in the development of speaking, reading, listening, writing, and general English language skills, as well as in the overall level of English, thanks to the use of Duolingo and Babbel, which are based on AI technologies. The results indicate that AI-driven platforms may effectively enhance English language proficiency. Karataş et al. (2024) found that ChatGPT plays a vital role in improving students' overall learning experience, as a significant improvement in writing, grammar, and vocabulary was observed. Its flexible and user-friendly design contributes to greater student motivation and engagement, making it a useful tool in a variety of educational settings. Furthermore, the study opened avenues for further exploration of how AI-based tools such as ChatGPT can transform conventional teaching methods and encourage active learning in language teaching. This study is comparable to the current one, as it also investigated progress in writing skills, as well as motivation to learn. As in the cited study, the current study concluded that the introduction of AI-based applications is effective for both learning and motivation purposes.

In the current study, the first group to use AI-based applications almost unanimously expressed their satisfaction with such virtual learning platforms. According to Kumar (2023), AI language learning applications are highly valued by students, many of whom find them interesting and enjoyable. These digital tools, according to the researcher, provide learners with convenient opportunities to practice English outside of the conventional classroom setting, enabling users to engage with the language in an interactive and personalised way, and not only increase learners' motivation to learn, but also considerably improve their language proficiency. This study is in line with the current one, as overall, most respondents in the AI-assisted group reported enjoying using the applications, and the greater time spent learning supported the effectiveness of their motivation to learn another language in this way.

Another study, by Kashefian-Naeeini et al. (2023), aimed at expanding the vocabulary of respondents, showed that students who used AI applications to learn vocabulary achieved considerably better results in both learning and remembering new vocabulary compared to those who studied using conventional teaching methods. Advanced AI capabilities, the researchers noted, such as interactive exercises, real-time feedback, and personalised learning paths, provide a more dynamic and engaging learning experience. Such interactivity not only increases student engagement but also promotes deeper understanding and long-term memorisation, making AI tools particularly effective for foreign language learning. This study reiterated the findings of the current study that students are more attracted and motivated by the interactivity of such learning methods compared to classroom-based ones, which is a strong advantage for AI-based applications. Although the study showed better results in learning and memorising new vocabulary when using AI applications, it did not consider how this knowledge is retained in the long term or the effects of the lack of face-to-face interaction with teachers or classmates. Another notable aspect is the possible limitations in the variability of learning materials in such applications, as AI relies heavily on template approaches that may not accommodate the individual characteristics of all learners.

In the present study, Duolingo and Babbel were found to provide both grammar and reading development, but their technology is less adapted to direct real-time pronunciation correction. Applications that incorporate automatic speech recognition, such as STEMUP, showed considerable effectiveness in improving students' listening and speaking skills. ASR provides instant feedback on pronunciation and fluency, enabling learners to correct their speech in real time (Soiuzbek kyzy & Isaeva 2022, Issakova et al. 2025). Tsai (2022) showed that students using ASR technology experienced marked improvements in their oral communication and expressed a positive perception of their learning experience. Duolingo and Babbel were found to have a wider range of features aimed at developing different language skills, but did not provide as much in-depth support for speaking as STEMUP. The current study was slightly different in focus, concentrating on supported speaking, reading, writing, and listening, while the cited study was more focused on developing lexical skills. However, this study once again supported that, as a rule, students report greater performance from AI-based applications.

Another argument that supported the current study's point about the effectiveness of AI in foreign language learning comes from Mini et al. (2018) and Xie (2022), who implemented computer-assisted instruction (CAI) in their studies, reporting that this teaching methodology consistently demonstrates the ability of respondents to significantly improve their English language learning outcomes compared to conventional teaching methods. Through the use of a wide range of multimedia resources, such as video, audio, interactive exercises, and visual aids, computer-assisted instruction creates a more engaging and stimulating learning environment (Lavrentieva et al. 2019, Vazov et al. 2022). This approach, according to the researchers, not only captures learners' attention more effectively but also accommodates various learning styles, making it particularly useful for learners with auditory, visual, and kinaesthetic perceptions. Furthermore, the flexibility and adaptability of CAI enable the creation of personalised learning programmes, which further enhance its effectiveness in improving language proficiency. When using AI-based applications such as Duolingo and Babbel in the current study, it was found that such learning improved listening, writing, and general language skills, while researchers also noted the benefits of CAI in creating a stimulating and engaging learning environment.

However, there are some other opinions in the scientific community about the feasibility of introducing AI for learning English. For instance, Toboula (2023) and Iaburova (2019) noted that AI-based curricula can contribute to the development of learners' dependence on technology. This growing dependence can lead to a decrease in the use of conventional learning approaches, such as reading books, engaging in discussions, or practising language skills with peers. As learners increasingly rely on automated systems for instant feedback and guidance, there is a risk that they may be unable to fully engage with the learning material on a deeper level. Over time, this can hinder the development of critical thinking and problem-solving skills, as learners may become accustomed to passive learning, expecting quick solutions without the need for thoughtful reflection or active problem-solving. The convenience and immediacy that AI tools offer, while an advantage in some contexts, may inadvertently limit learners' ability to develop the core cognitive skills that are developed through more conventional, hands-on learning. Contrary to the findings of this study, the current research does not exclude conventional teaching methods, but suggests combinations of them to increase learner motivation, develop more varied and personalised learning, and do the deliver of learning material in this style. Notably, in modern society, books and other learning resources are also delivered through technology, and therefore, the use of AI is unlikely to cause addiction. AI can support repetitive tasks such as grammar exercises or pronunciation practice, but such learning should be complemented by human interaction and active learning strategies that encourage learners to think critically, experiment, and work creatively with the language.

In the current study, the possibility of instant feedback was considered as one of the benefits of introducing AI because it saves teachers time in checking each task and creates a more personalised and faster learning experience for the user. However, according to Li et al. (2023), this is a major disadvantage, because although AI tools can provide instant feedback on language use, the quality and accuracy of this feedback can vary substantially. Some applications may misinterpret user input or fail to recognise nuances in language use, resulting in false corrections or suggestions. This can be frustrating for learners who rely on these tools to provide accurate guidance in their language learning process. In contrast, the current study used Duolingo and Babbel because both applications are constantly improving their algorithms and are based on extensive amounts of data. They provide more accurate recognition of context and language nuances, minimising the number of false corrections. Furthermore, Duolingo and Babbel integrate learning materials developed by language experts, which ensures a balanced interaction between automated feedback and content reviewed by experts. Both platforms provide multi-level support for various aspects of the language, from grammar to conversational practice, helping users to get a more reliable learning experience without substantial errors in feedback. Therefore, to avoid such a disadvantage, it is vital to choose applications that are best optimised for the needs.

In the current study, the phenomenon of AI in the development of transversal competencies for future teachers explores the role AI plays in shaping the diverse skills and abilities that educators need in the modern classroom. Transversal competencies refer to a broad range of general skills, such as critical thinking, problem-solving, communication, and adaptability, which are valuable across various disciplines and professions. Popova (2024) discusses the advantages and disadvantages of using AI to enhance competencies in future teachers. The pros include personalized learning, efficiency, data-driven insights, innovative pedagogy, and global competence. However, the cons involve over-reliance on technology, bias in AI systems, job displacement, ethical concerns, and unequal access to AI tools in education.

Franqueira et al. (2024) and Vieira et al. (2024) reported that the use of tools such as ChatGPT raised concerns about possible plagiarism and the authenticity of student work. There is a risk that students may rely on AI to write assignments, which calls into question the autonomy of their work and compliance with academic standards. Furthermore, privacy issues are important, as AI-based educational systems require the collection and analysis of large amounts of student data. According to the present study, the claim that AI compromises student autonomy may overestimate the risks, as the responsible use of technology can be effectively integrated into the learning process. Students can learn to use AI as a tool to increase efficiency, improve research, and develop critical thinking. Furthermore, AI can help teachers grade papers faster, automate administrative tasks, and provide detailed feedback to students, thus giving teachers more time for individualised learning. Even privacy issues related to the processing of student data can be addressed through the implementation of strict data protection regulations, which are already in place in many areas.

Thus, the existing studies, along with the current one, overwhelmingly support the introduction of AI technologies in education, but it is worth considering the opinions of other studies that point to certain imperfections in AI training and operation. These aspects should be considered when building training with AI elements.

The findings indicate that AI-driven platforms such as Duolingo and Babbel significantly improve language competency, especially in listening, writing, and general language abilities, implying their effective integration into teacher training programmes. The capacity of AI to customise learning trajectories and provide instantaneous feedback can assist aspiring educators in enhancing their linguistic abilities and teaching proficiencies. This tailored approach corresponds effectively with the increasing demand for adaptable and flexible pedagogical tactics that address varied student requirements. The study emphasises the necessity of a balanced integration of AI technologies, highlighting the importance of preserving human interaction and traditional teaching methods to ensure that educators cultivate essential interpersonal skills and critical thinking for effective instruction. This indicates that AI can augment some facets of teacher training, but it needs to supplement rather than supplant human-centred pedagogical methods. The findings underscore the necessity of tackling obstacles, including data privacy issues and excessive dependence on technology, which may affect the sustained efficacy of AI in teacher education.

6. Conclusion

One of the key findings of the study was the confirmation that students who employed adaptive AI technologies achieved considerably better outcomes in English language tests. Specifically, the mean score of the group of students who used AI-based applications increased from 74 to 88 points in the TOEFL test, while the second group saw a minimal increase from 81 to 83 points. The greatest progress was observed in listening and writing, which demonstrates the effectiveness of adaptive platforms in developing these skills.

Quantitative indicators of the study demonstrated that the use of AI-based applications considerably improves students' performance. For instance, the first group of students who studied with Duolingo and Babbel showed the greatest progress in listening (from 16 to 22 points) and writing (from 18 to 21 points). Furthermore, the motivation to learn was greater in this group - students were more likely to practice English outside the curriculum, which also affected their performance. Qualitative indicators of the study include users' assessment of the convenience and effectiveness of the platforms. About 89% of students who used Duolingo positively assessed the platform's usability, but 60% indicated a lack of exercises to develop their speaking skills. The Babbel platform, on the other hand, was better rated for developing conversational skills, with 96% of respondents finding it effective in this regard.

The main recommendation is to integrate AI technologies into the educational process, especially for learning foreign languages. They not only improve performance but also increase student motivation by enabling them to learn at their own pace and tailor to their needs. However, for further development in this area, it is necessary to improve the platforms, paying attention to the shortcomings of these applications and using a combination of these platforms with conventional methods of learning a foreign language.

One of the key limitations of the present study was that the sample of students was limited to participants from Ukraine, which may affect the overall representativeness of the findings, and that the study was based on the analysis of only two AI platforms – Duolingo and Babbel – as many other applications may have other approaches to learning and offer other useful features that may change the way AI is implemented in education. The implementation of adaptive AI-based technologies over time is one of the possible areas for future research to better understand their effects on long-term language learning. This study clarifies AI's impact on teacher education by illustrating that AI-driven platforms, such as Duolingo and Babbel, can improve language proficiency and pedagogical skills, providing critical insights into the effective integration of adaptive learning technologies into teacher training programmes to promote personalised and dynamic educational experiences.

Acknowledgement

None.

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