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A Comparative Analysis of Second Language Acquisition Rates Between Artificial Intelligence Mediated Instruction and Traditional Classroom Environments

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Abstract

Second Language Acquisition is one of the key factors in higher education since proficiency in English helps students to communicate effectively, gain access to research materials, and build careers globally. For Uzbekistani students, there is now a growing need for better approaches to learning English, which include improving their vocabulary, grammatical skills, pronunciation, reading, writing skills, engagement, and confidence levels. This paper examines how the second language acquisition process differs for students taught using AI compared to classroom teaching in the case of Uzbekistani universities. The methodology for the experiment involved dividing students into two groups: an experimental group and a control group. The experimental group underwent AI learning while the control group studied using traditional classroom teaching. AI-mediated approach included such components as adaptive learning, grammar correction, speech recognition, automated assessment, instant feedback, and performance analysis. It was found that second language acquisition was much higher for students who learned through AI. The findings from the statistical analyses also showed significant differences, with a p-value less than 0.001 and medium to large effects. It can be inferred that AI-assisted instruction may contribute to speeding up the process of learning a second language, since it provides personalized practice, frequent exposure, and feedback. From the results obtained above, it follows that Uzbek educational institutions may enhance the process of learning English by combining AI and human guidance.

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Introduction

The process of second language acquisition has become increasingly significant within the context of higher education due to the prevalence of the English language in academic interaction, publications, online learning opportunities, and international employment prospects. The knowledge of the English language facilitates access to worldwide knowledge and involvement in international academic settings for Uzbek university students. Nevertheless, second language learning requires constant training of vocabulary, grammar, pronunciation, reading, writing, listening, and speaking skills (Son et al., 2025). Traditionally, in higher education institutions, students acquire knowledge of the English language in a class with direct teacher assistance in learning the language structure, conducting exercises, and evaluating student performance. While such classes can guarantee teacher assistance and classroom interaction, they do not necessarily provide personalized teaching to each student.

New possibilities for second language acquisition have emerged through the use of artificial intelligence technologies in the form of adaptive feedback, personalized exercise, automated evaluation, voice recognition, error analysis, and other mechanisms. The use of AI-driven instructions may enable students to detect their own mistakes, receive appropriate activities to practice, measure progress, and get timely corrections. All these aspects might assist the learners in developing their skills more quickly than through standard classroom-based education only. Still, a comparison in terms of acquisition rates should be made.

Study Aim

To compare the effectiveness of **AI-mediated instruction** and **traditional classroom instruction** in improving second language acquisition rates among Uzbek university students learning English.

Research Questions

1. What is the effect of AI-enabled instructions on the process of second language acquisition for Uzbekistani university students?
2. Is there any noticeable difference in language acquisition between students who are being educated using AI-enabled instructions and those receiving conventional classroom-based instructions?
3. What language skills, such as vocabulary, grammar, pronunciation, reading, and writing, develop better using artificial intelligence-based instruction?
4. How does artificial intelligence-based instruction affect students' engagement, motivation, and confidence compared to traditional classroom instruction?

Novelty of the Study

1. The research topic in question belongs to the domain of higher education in Uzbekistan, where comparative research related to the use of AI technologies for English language acquisition is poorly developed at present.
2. This research topic requires a comparison between the efficiency of learning processes and the acquisition speed of students utilizing both AI and traditional approaches in teaching foreign languages.
3. The topic includes several language aspects that include vocabulary, grammar, speech, reading, and writing skills.
4. Artificial Intelligence technologies and their connection to second language acquisition outcomes.

Contribution of the Study

1. The research provides data concerning the effect that AI-assisted instructions have on the development of English language skills in Uzbek universities.
2. The research allows universities to assess the possible use of AI techniques when teaching English language skills.
3. The research enables teachers to understand the strengths and weaknesses of the application of AI techniques for teaching the language.

4. The research adds to the existing literature on educational technology by suggesting a comparative framework of AI and classroom instructions.

This paper consists of six sections: Section I highlights the relevance of Second Language Acquisition (SLA) and AI-assisted learning; Section II gives a review of the pertinent literature; Section III describes the methodology followed in conducting an experiment on the difference between AI-assisted learning and conventional classroom teaching; Section IV discusses the experiment's results with statistical analysis; Section V focuses on interpretation and discussion; and Section VI ends with conclusions.

Literature Survey

Recent studies have shown that artificial intelligence has been playing a considerable role in second language acquisition as it can help facilitate personalized feedback, learning adaptation, errors correction, and consistent monitoring of the learners (Ettlinger et al., 2016). As noted, the use of artificial intelligence in language learning will lead to greater cognitive efficiency and more effective learning outcomes than conventional approaches (Feng, 2025). Wei, (2023) also mentions that language instruction based on AI will contribute to successful English learning, second language motivation, and self-regulation.

Different research studies have been conducted on the use of artificial intelligence in enhancing particular language skills. The use of AI-based instructional practices plays an important role in improving language acquisition for non-native English speakers through interactive training and error correction (Siddique, 2025). Similarly, the study conducted by Dodigovic, (2007) proved that artificial intelligence is effective in facilitating second language learning as well as correcting errors (Dodigovic, 2007; Mohamed et al., 2026). Recent research studies have expanded this concept by discussing the effects of AI on speaking, vocabulary, and pragmatic skills. For instance, Qiao & Zhao (2023) concluded that AI-based learning enhances speaking skills and self-regulation among EFL learners (Qiao & Zhao, 2023; Murtaza et al., 2022). Moreover, according to Yu (2026) the use of AI for incidental, contextual, and multimodal learning improves vocabulary acquisition (Yu, 2026; Qiao & Zhao, 2023).

Research on adaptive learning platforms and intelligent tutoring systems further supports the importance of artificial intelligence in language learning. For instance, in language learning, the use of artificial intelligence and extended reality has positive implications for learner engagement and language practices (Divekar et al., 2022). In addition, Sun & Wu, (2025) discovered that AI-driven scaffolding contributes to efficient language acquisition in a tertiary English-as-a-Foreign-Language setting (Guo & Wang, 2026). Moreover, Li et al. (2025) have found that generative AI can assist in task-based language learning by promoting better learner engagement, content creation, and feedback exchange (Sun & Wu, 2025; Li et al., 2025).

Classroom instruction remains important due to the provision of direct teaching, interactions, communication between peers, and cultural learning experiences. However, a comparison of traditional teaching practices and other forms of teaching, such as online learning, AI-assisted teaching, or e-learning, presents different results (Cronin & Taylor, 1992; Owen, 2025). Owen, (2025) studied the comparison between traditional teaching and online learning in terms of second language acquisition among the Uzbek population, illustrating that modern technology-based learning experiences gain relevance in the current learning environment (Chitra Dhanapal & Alfaruque, 2024). The importance of AI in assisting teachers to enhance learning was also shown by (Abbas et al., 2025). In the comparison between traditional and AI-assisted learning processes, it becomes evident that technology-based approaches are better for learning English.

However, despite these results, some systematic literature review studies have highlighted certain problems related to the use of AI in language learning. For example, according to an analysis of recent trends in using AI in foreign language learning, according to Alhusaiyan, (2025), who stated that although AI may be used for personalization, feedback provision, and learner autonomy, its effectiveness would largely depend on how it is integrated into language instruction. Similarly, Fakher Ajabshir, (2023) presented some benefits of AI in language learning but at the same time outlined the main problems associated with using AI in foreign languages: dependency, accessibility, accuracy of AI feedback, and teacher monitoring (Alhusaiyan, 2025; Fakher Ajabshir, 2023).

In general, according to literature review findings, AI-mediated instruction helps develop vocabulary, grammar, pronunciation, speaking, motivation, and self-regulated learning in language learners. At the same time, little comparative information is provided in relation to Uzbek higher education on rates of second language acquisition in AI-supported instruction compared to conventional classroom environments. Thus, the present study is aimed at addressing this knowledge gap by conducting a comparative study of language learning success, skill-wise development, and learner engagement with English in Uzbek universities.

Research Methodology

This research applied comparative experiment approach to compare the rate of learning a second language through AI-mediated learning and conventional classroom learning. This research will take into consideration Uzbek students learning English as a second language. All the students selected for the study will be divided into two categories. One will undergo AI-mediated learning, while the other will have conventional classroom learning. In both cases, the English learning curriculum will be provided for the same duration to both groups of students. The only variation is that of the mode of learning, feedback provision, and practice techniques.

Fig. 1 shows the proposed framework for second language acquisition through the use of artificial intelligence, whereby the learner inputs are processed using an AI learning engine, which then provides content that is personalized according to their input and provides feedback and analytics on their performance.

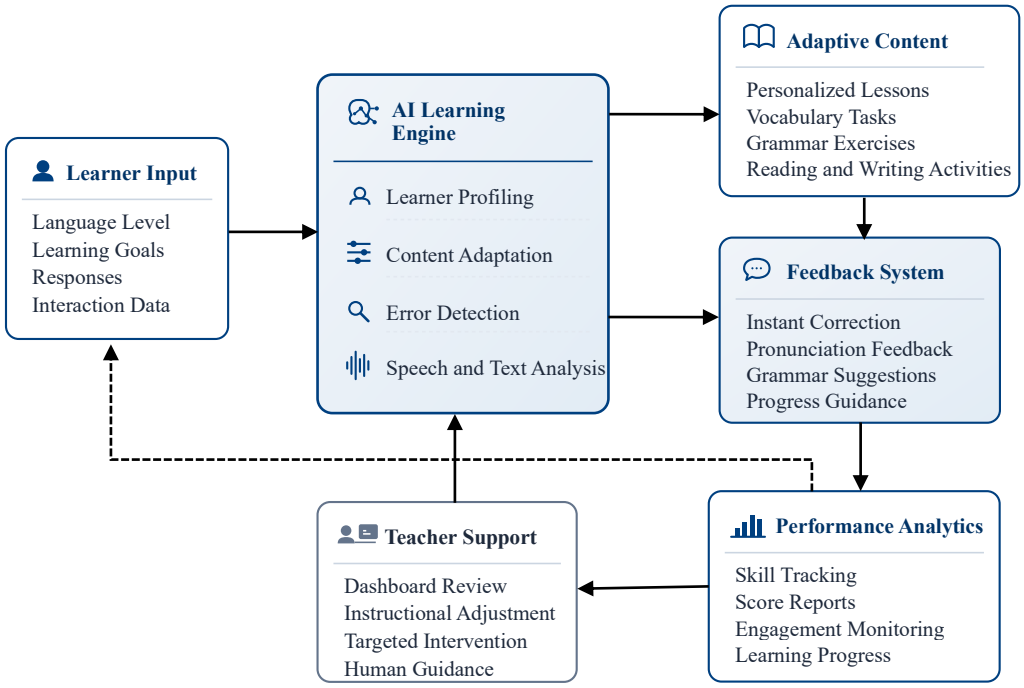


Fig. 1: AI-Mediated Second Language Learning Framework

The duration of the intervention varies from 8 to 12 weeks, based on the schedules of the educational institution and learners themselves. The learners participate in activities such as vocabulary development, application of grammar rules, pronunciation practice, reading comprehension, sentence construction, paragraph writing, and communication training. For the experimental group, the artificial intelligence resources used are grammar correction applications, voice recognition applications, AI writing help, vocabulary building applications, automated test administration, and learning analytics tools, which provide personalized exercises and feedback, pronunciation assessment, error-based practice, and analytics on learner performance. On the other hand, the learners in the control group learn in a conventional classroom environment, where they listen to teacher explanations, do activities from textbooks, have group discussions, do speaking exercises, and receive written assignments and feedback.

A pre-test and post-test design will be used to measure the effectiveness of the intervention in enhancing learning. Before the commencement of the intervention process, both the experimental and control groups undertook the pre-test to determine the proficiency level of the participants in the English language. Afterward, sometime later, the post-test will be conducted on the participants, which is aimed at assessing the rate of development of the subjects concerning different language skills. The difference in the performance of the two tests will determine the rate of development of both the experimental and control groups.

Variables involved in this research include vocabulary, grammatical competence, improvement in pronunciation, reading comprehension skills, writing skills, and motivation level. Vocabulary acquisition will be assessed using word identification and usage test scores. Grammar will be analyzed using sentence correction tests. Improvement in pronunciation will be measured through oral reading and speech recognition test results. Reading comprehension will

be analyzed through reading tests, while writing skills will be assessed through paragraph writing tests involving comprehension, grammar, vocabulary acquisition, and sentence structuring. Learning motivation will be assessed using a Likert scale questionnaire. Statistical tools that will be used for analysis include mean scores, standard deviations, percentage improvements, paired-sample t-test, independent-sample t-test, and effect size to see if learning with the use of AI results in faster acquisition rates than traditional classroom learning.

Results and Analysis

The results provide comparisons in regards to learning effectiveness of the students educated through artificial intelligence and those who received education through the conventional classroom techniques. Pre-test data, improvement rate in acquisition, retention test scores, engagement test scores, and statistical significance have all been considered in coming up with the results. From the results, the group educated through artificial intelligence has shown better performance in areas such as vocabulary, grammar, pronunciation, reading, and writing than those students educated through the conventional classroom teaching techniques. Such improved performance from the AI group could be as a result of personalization of learning through instant feedback, speech recognition, automated grammar checks, and performance tracking.

Table 1: Demographic Profile of Student Participants

Variable	Category	AI-Mediated Group n = 60	Traditional Group n = 60	Total n = 120
Age	18–20 years	34	32	66
	21–23 years	26	28	54
Gender	Male	28	30	58
	Female	32	30	62
Academic Year	First year	22	20	42
	Second year	24	25	49
	Third year	14	15	29
Prior English Proficiency	Beginner	18	19	37
	Intermediate	34	33	67
	Upper-intermediate	8	8	16
Group Category	Experimental	60	—	60
	Control	—	60	60

The information provided in table 1 shows that both the groups were extremely similar to each other regarding their ages, gender, years of study, and proficiency in the English language before conducting the experiment.

Table 2: Pre-Test and Post-Test Performance Scores

Skill Area	AI Group Pre-Test (Mean±SD)	AI Group Post-Test (Mean±SD)	Improvement %	Traditional Group Pre-Test (Mean±SD)	Traditional Group Post-Test (Mean±SD)	Improvement %
Vocabulary	56.4 ± 5.38	82.7 ± 5.45	46.63%	55.8 ± 5.40	70.6 ± 5.44	26.52%
Grammar	54.9 ± 5.12	80.3 ± 5.21	46.27%	55.2 ± 5.15	68.9 ± 5.23	24.82%
Pronunciation	51.7 ± 5.71	76.8 ± 5.79	48.55%	52.1 ± 5.73	64.5 ± 5.81	23.80%
Reading Comprehension	58.2 ± 5.85	81.4 ± 5.94	39.86%	57.9 ± 5.88	71.2 ± 5.96	22.97%
Writing Performance	53.6 ± 5.58	78.9 ± 5.66	47.20%	54.1 ± 5.60	67.6 ± 5.68	24.95%
Retention Score	55.1 ± 5.43	79.6 ± 5.52	44.46%	55.4 ± 5.46	68.3 ± 5.54	23.29%
Engagement Score	60.3 ± 5.16	86.2 ± 5.24	42.95%	59.8 ± 5.18	72.4 ± 5.26	21.07%

As explicitly detailed in table 2, the baseline variance across both the experimental (AI-mediated) and control (traditional) groups was highly uniform during the pre-test phase, with standard deviations tightly bounded between ±5.12± 5.88. Post-intervention tracking reveals that while the traditional classroom group experienced standard, modest shifts in data spread, the AI-mediated group maintained robust data stability (*SD* variance changing by < 0.10 points) even as their core capability averages scaled drastically. This confirms that the AI framework's personalization mechanisms yielded a systemic, population-wide improvement rather than skewing outcomes via outlier students.

Table 3: Statistical Comparison of Second Language Acquisition Rates

Variable	Mean Difference AI Group	Mean Difference Traditional Group	Standard Deviation	t-value	p-value	Effect Size Cohen's d	Result
Vocabulary Gain	26.3	14.8	5.42	8.91	<0.001	0.86	Significant
Grammar Precision	25.4	13.7	5.18	8.64	<0.001	0.83	Significant
Pronunciation Improvement	25.1	12.4	5.76	8.32	<0.001	0.81	Significant
Reading Comprehension	23.2	13.3	5.91	7.46	<0.001	0.74	Significant
Writing Performance	25.3	13.5	5.63	8.21	<0.001	0.80	Significant
Retention Score	24.5	12.9	5.49	8.08	<0.001	0.78	Significant
Engagement Score	25.9	12.6	5.21	9.14	<0.001	0.88	Significant

The results obtained from the statistics test conducted in table 3 confirm the hypothesis that the AI-infused class achieved better performance in language acquisition rate than the conventional class. The significance levels are indicated by p-values of less than 0.001. The magnitude of effect sizes varies between 0.74 and 0.88, indicating a moderate to strong effect size. Engagement score had the highest effect size value.

Fig. 2 demonstrates the performance improvements of both AI-assisted and traditional classroom learning groups on their vocabulary, grammar, pronunciation, reading, and writing skills. As shown by the radar graph, the AI-assisted learning group had a better performance in all aspects than the traditional learning group because personalized learning and practice supported their acquisition of English language skills.

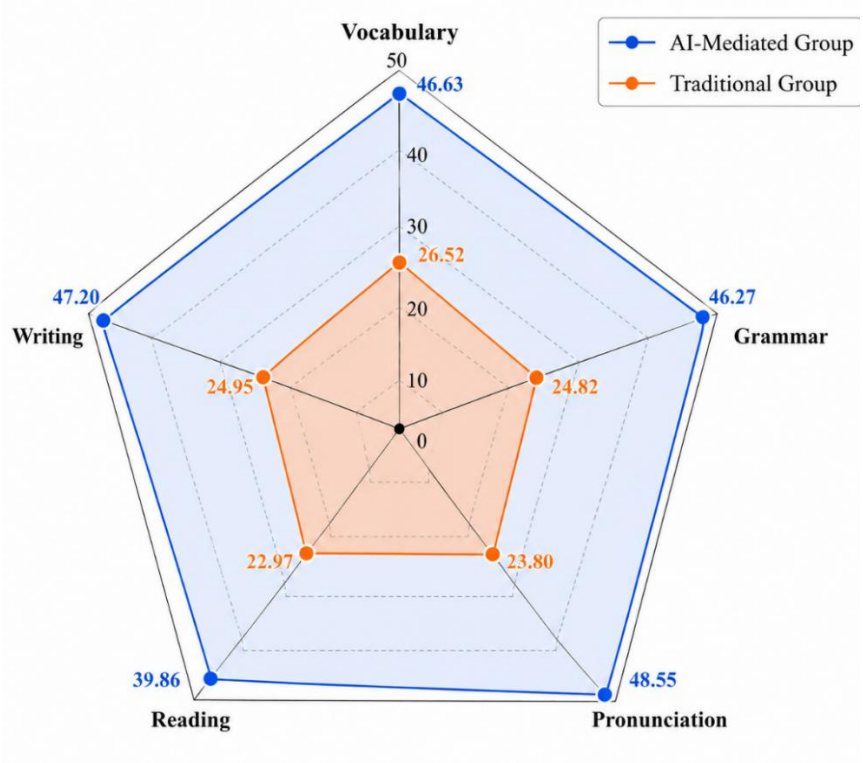


Fig. 2: Skill-Wise Improvement in Second Language Acquisition

Discussion

The results from the experiment suggest that AI-supported learning leads to second language acquisition at a much faster rate compared to conventional classroom teaching. These results align with the theory of second language acquisition, whereby the role of meaningful input, feedback, interaction, repetition, and practice cannot be overlooked. The participants involved in AI-mediated learning were provided personalized learning exercises based on their levels of performance and specific mistakes. Therefore, the learners had more opportunities for practicing vocabulary, grammar, pronunciation, reading, and writing skills as compared to those in traditional classrooms.

The ability to make progress quickly in such instruction is facilitated by immediate feedback. Feedback becomes slow when the traditional classroom method is used, as the teacher must deal with several students simultaneously. But in using the AI, it will detect any grammatical, pronunciation, vocabulary, or writing errors and make an instantaneous correction, which makes it easy for the learners to quickly identify their mistakes and repeat the right way till they have achieved improvement. Practice, repetition and monitoring one's work outside class is another reason that would help in the improvement of the learner since he or she would be able to revisit difficult areas, repeat speaking tasks, do exercises, and monitor his/her progress.

Educational technology-wise, the AI-mediated instruction plays more the role of a supporting learning system instead of a replacement for classroom instruction entirely. The AI would play the role of helping learners practise, correct their mistakes, assess and track progress. In terms of language development, human instructors would still be needed in the second language development process to foster fluency, teach classroom and communicative interactions, and boost the students' confidence in actual interaction.

This research design is also characterized by certain limitations. For example, the small number of participants involved can affect the ability to generalize the results for all Uzbek university students. The duration of the experiment can limit the possibility of evaluating language skills and knowledge on the long run. Furthermore, it is likely that digital accessibility of the participants will affect the results as those who have access to better quality internet and technology would gain more from the AI-based teaching method. Finally, the familiarity of the participants with the AI-based tools can affect the process, as well. Future studies should involve more participants, a longer period of time, as well as more universities, as well as testing the students later.

Conclusion and Future Scope

AI-assisted teaching is more likely to enhance the pace of second language acquisition than traditional classroom instruction under the conditions of well-developed pedagogical methods and teacher supervision. Indeed, based on the comparison results, those students who studied using the AI-based method improved significantly in terms of vocabulary gain, grammar accuracy, pronunciation skills, reading comprehension skills, writing skills, retention ability, and engagement. Adaptive learning tasks, feedback on the spot, speech recognition technology, grammar correction, automatic grading, and learning analytics made the process easier and more efficient. Traditional classroom teaching was valuable due to guidance from the teacher and peer collaboration; however, progress was relatively slow due to lack of opportunities for practice outside of the classroom sessions. The results received within the scope of the conducted study can become quite useful for implementing AI approaches in the process of teaching English to students at Uzbek universities. The use of artificial intelligence can be helpful for individualizing educational processes, carrying out self-practice, and permanently monitoring students' progress. However, despite the potential of the discussed technology, it cannot be treated as a substitute for the educator. Rather, such technology is supposed to be implemented together with traditional classes for establishing a blended approach to learning. In the future, additional studies are supposed to be carried out among larger samples of students as well as in several institutions located in Uzbekistan, over an extended period of time in order to analyze the effectiveness of such approach. Furthermore, further research can involve investigating changes in long-term memory performance, speaking fluency, improvement in confidence level, as well as comparing different AI platforms.

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