

Artificial Intelligence in Language Instruction: Impact on English Learning Achievement and L2 Motivational Self-System

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Abstract

This mixed-methods study investigates the impact of Artificial Intelligence (AI)-mediated language instruction on English learning achievement and the Second Language Motivational Self System (L2MSS) among English as a Foreign Language (EFL) learners, addressing the growing interest in AI-driven educational technologies and their potential to transform language instruction. It involved two intact university classes with a total of 90 students, where the experimental group received AI-mediated instruction, and the control group received traditional language instruction. Both groups were assessed using pre-tests and post-tests to measure English learning achievement across two abilities, including reading comprehension and writing skills, while questionnaires were used to evaluate L2MSS. Quantitative analysis revealed that the experimental group outperformed the control group in all assessed areas of English learning achievement, and they also demonstrated higher levels of second language (L2) learning motivation, suggesting that AI-mediated instruction has a positive effect on both English learning achievement and L2MSS. Furthermore, qualitative insights from semi-structured interviews with nine students from the experimental group highlighted the transformative effects of the AI platform, which enhanced student engagement and offered personalized learning experiences, thereby boosting motivation and fostering more effective second language learning. The results indicate that AI-mediated language instruction has the potential to revolutionize language learning by improving outcomes and increasing learner motivation, underscoring the significant positive impact

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of AI-driven educational technologies in language education. This study contributes to evidence-based language pedagogy by providing valuable insights for educators and researchers interested in integrating AI-powered platforms into language classrooms.

Keywords: Second language motivational self system, Artificial intelligence (AI)-mediated language instruction, English learning, English as a foreign language

Introduction

Artificial Intelligence (AI)-assisted language learning improves language learning using AI. This strategy can integrate customized learning paths, interactive exercises, prompt feedback, adaptive learning algorithms, and language practice tools driven by artificial intelligence, such as chatbots. The Second Language Motivational Self System (L2MSS; Dörnyei, 2009) is a framework to understand and analyze the motivational aspects involved in learning a second language. AI-assisted language learning applications have demonstrated a significant role in enhancing English language learners' overall language learning achievement as well as specific language skills and sub-skills (El Shazly, 2021; Kim, 2023; Lee et al., 2023; Schmidt-Fajlik, 2023; Xu et al., 2023; Yan, 2023). Carpio Cañada et al. (2015) examined the effects of an AI-powered language learning approach on language learners' motivation and learning achievement. The results indicated that the AI-assisted language learning approach contributed to the learners' language learning motivation. The learners' motivation for language learning activities also resulted in their better learning achievement. In conclusion, these three factors are deeply interconnected. A motivated learner using AI-assisted tools is likely to experience a more engaging and effective learning process, leading to higher English learning achievement. Future research and practical applications should continue to explore these relationships to maximize the benefits of AI in language learning while fostering strong motivational frameworks.

L2MSS

The L2MSS theory (Dörnyei, 2009) has three dimensions: the ideal L2 self-motivates learners by showing them what they desire to become. It includes second-language fluency goals, objectives, and hopes. The ought-to L2 self inspires students based on parental, teacher, and social expectations. The L2 learning experience emphasizes classroom learning. Interactive language sessions and fun learning activities can motivate students. According to some

research, L2MSS is an aptitude that influences why and how students learn a second language. Research indicates that a strong ideal L2 self can improve language learning perseverance and effort (Elahi Shirvan et al., 2021). Fathi et al. (2023) found that the L2MSS and basic psychological demands like autonomy, competence, and relatedness influence language achievement and enjoyment. Overall, L2MSS encapsulates both internal and external motivational factors that drive language learning. This system helps to explain not only the amount of effort learners are willing to invest but also their resilience and persistence in the face of challenges, making it a comprehensive framework for understanding language learning motivation.

Method

This study was conducted at a university in mainland China, focusing on exploring the effectiveness of an AI-mediated language learning platform, specifically Duolingo, compared to traditional language instruction. The participants, comprising a carefully selected group of 90 EFL learners divided into experimental and control groups, underwent pre-tests and post-tests evaluated by the College English Test Band 4 (CET-4), which is a standardized English proficiency test administered in China. For the experimental group, the AI-mediated language learning platform, Duolingo, was utilized to deliver interactive and personalized English language lessons. Learners in the experimental group had access to a variety of interactive exercises, online quizzes, language games, and real-time feedback tailored to their performance on the platform. The control group received traditional language instruction using standard teaching materials, including textbooks and classroom activities. Teacher-led discussions, grammar drills, reading passages, and writing exercises were incorporated into the curriculum to facilitate language learning in the control group. Additionally, the study utilized the L2MSS questionnaires to assess motivational factors. For the qualitative phase, the thematic analysis examined semi-structured interview data from nine students in the experimental group. Codes were organized into potential themes, reflecting meaningful patterns related to the impact on English learning achievement and L2 motivation self-system.

Analysis and Discussion

After the 8-week intervention period, both groups underwent a post-test assessment mirroring the pre-test evaluation. For the quantitative phase, independent-sample t-test and paired samples t-test analyses examined the effect of AI-mediated language instruction on English learning achievement,

and L2MSS of EFL learners. Statistical Package for the Social Sciences (SPSS) version 27 was used for all analyses.

An independent-sample t-test (see Table 1) was conducted to compare the control group and experimental group's achievement and L2MSS pre-test scores. There was no significant difference in scores for control and experimental groups, evidenced by the p-value being > 0.05 which indicates there is no significant difference between the two pre-test groups.

In Table 1, the p-value of the achievement and L2MSS scores at the pre-test and post-test is < 0.05 , hence we can conclude that there is a significant difference. According to the mean scores for each of the two sets of scores, the mean achievement and L2MSS scores at the pre-test were 53.2 and 148.7, and the mean scores at post-time were 61.5 and 179.4. Therefore, it can be deduced that the experimental group demonstrated a significant enhancement in both achievements and L2MSS in statistics following the intervention. This suggests that AI teaching methods provide a substantial advantage in enhancing students' academic performance and students' motivational systems for learning English as a second language.

Via the interview, participants emphasized that the interactive and adaptive elements of the AI platform significantly improved their language competency, particularly in areas such as reading comprehension and writing. As a result, they achieved higher grades and developed greater academic confidence. A participant shared, "I previously faced difficulties in writing essays, but my writing skills improved after utilizing the AI platform. This semester, I achieved my highest grades on an essay." The AI platform's interactive exercises, along with dynamic language games and instant feedback, fostered an engaging environment that captivated their focus and enhanced their enjoyment of the learning process. "By cultivating a sincere curiosity in the English language, I ignited a fervor for ongoing investigation and education." The participants' desire to spend additional effort on their language practice demonstrated the influence of this inherent

Table 1. T-test analysis between the two groups of pre- and post-test on achievement and L2MSS

Dependent Variable	Groups	N	Pre-test				Post-test			
			Mean	Std. Deviation	t-value	p-value	Mean	Std. Deviation	t-value	p-value
Achievement	experimental	45	53.2	10.9	0.91	.124	61.5	10.0	-3.021	.004
	control	45	55.7	12.1			53.9	11.8		
L2MSS	experimental	45	148.7	11.2	1.90	.755	179.4	18.5	-6.436	<.001
	control	45	153.3	11.9			154.6	17.2		

incentive. A participant stated, “The AI platform sparked my interest. My motivation to learn came not from a sense of obligation, but from a genuine desire to improve my abilities and expand my understanding of the language.”

Conclusion

When using AI teaching methods compared to traditional teaching methods, both English learning achievement and student motivation significantly improve, suggesting that AI teaching methods hold considerable promise for improving educational outcomes in the context of college English education. The study further highlights the potential of AI-powered language learning tools to revolutionize EFL classrooms by creating a personalized and adaptive learning environment. Learners engaging with interactive AI platforms receive instant feedback, comments, and alternative sentences, fostering continuous improvement and instilling confidence in their language abilities. This real-time support creates a supportive and encouraging atmosphere, promoting a positive learning experience. In addition, the integration of AI in language learning opens up exciting avenues for research and development in language pedagogy. Future research should explore the longitudinal impacts of AI teaching methods and investigate their applicability across diverse educational settings and subject areas.

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