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GRAMMAR ACQUISITION IN ADULT EFL LEARNERS VIA HUMAN-CENTERED AI AND TEACHER MEDIATION

Abstract

The integration of artificial intelligence (AI) into language education is transforming grammar instruction. This study investigates the impact of a human-centered AI approach on grammar acquisition in adult EFL learners over a 45-day period. Combining AI-supported exercises with teacher guidance, participants demonstrated significant improvement in grammar accuracy, as measured by pre- and post-tests and weekly writing tasks. Comparison with two recent studies indicates that paired AI feedback and teacher mediation outperform single-method instruction by providing immediate error detection and contextual explanation.

Keywords: Human-Centered AI, Grammar Acquisition, Teacher Mediation, Adult EFL Learners, AI-Supported Education

Аннотация

Интеграция искусственного интеллекта (ИИ) в языковое образование существенно трансформирует процесс обучения грамматике. В данном исследовании анализируется влияние человеко-ориентированного подхода с использованием ИИ на усвоение грамматики взрослыми изучающими английский язык как иностранный (EFL) в течение 45-дневного периода. Совмещение упражнений с поддержкой ИИ и педагогического сопровождения привело к значительному повышению грамматической точности, что было подтверждено результатами входного и итогового тестирования, а также еженедельными письменными заданиями. Сравнение с

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двумя недавними исследованиями показывает, что интеграция автоматизированной обратной связи ИИ и педагогической медиации превосходит односторонние методы обучения, обеспечивая оперативное выявление ошибок и их контекстуализированное объяснение. Полученные результаты подчеркивают эффективность человеко-ориентированного ИИ в обучении грамматике взрослых изучающих EFL.

Ключевые слова: Человеко-ориентированный искусственный интеллект; Усвоение грамматики; Педагогическая медиация; Взрослые изучающие EFL; Обучение с использованием ИИ

Annotatsiya

Sun’iy intellekt (SI) texnologiyalarining til ta’limiga joriy etilishi grammatikani o‘qitish jarayonida yangi yondashuvlarning shakllanishiga olib kelmoqda. Ushbu tadqiqot 45 kunlik o‘quv davri davomida voyaga yetgan EFL o‘rganuvchilarida grammatika o‘zlashtirish jarayoniga insonlarga moslashtirilgan sun’iy intellekt yondashuvining ta’sirini tahlil qilishga qaratilgan. Tadqiqot doirasida SI tomonidan qo‘llab-quvvatlangan grammatika mashqlari o‘qituvchi vositachiligi bilan birgalikda qo‘llanildi. O‘rganuvchilarning Grammatik aniqligi oldindan va yakuniy testlar, shuningdek, haftalik yozma topshiriqlar natijalari asosida baholandi. Olingan natijalar grammatika aniqligida o‘zgarishlar mavjudligini ko‘rsatdi. Ikki so‘nggi tadqiqot bilan olib borilgan taqqoslash SI asosidagi avtomatlashtirilgan fikr-mulohazalar va o‘qituvchi tomonidan berilgan izohlarni birlashtirgan yondashuvning yagona metodlarga asoslangan o‘qitish bilan qiyosiy jihatdan farqlarini aniqlash imkonini berdi. Tadqiqot natijalari insonlarga moslashtirilgan sun’iy intellect yondashuvining grammatikani o‘qitish jarayonidagi o‘rni va qo‘llanish imkoniyatlarini muhokama qilishga asos yaratadi.

Kalitso‘zlar: Insonga yo’naltirilgan sun’iy intellekt; Grammatika o‘zlashtirish; O‘qituvchi vositachiligi; Voyaga yetgan EFL o‘rganuvchilari; SI asosidagi ta’lim

Introduction

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Artificial intelligence (AI) is increasingly used in language learning, providing instant error feedback and adaptive exercises. This study examines the long-term impact of a human-centered AI approach on adult EFL learners over 45 days, combining AI feedback with teacher guidance to maximize grammar acquisition.Grammar acquisition remains a persistent challenge for adult EFL learners, often hindered by first-language interference, limited exposure to target structures, and insufficient immediate feedback in traditional classroom settings. Recent advances in artificial intelligence (AI) provide opportunities to enhance language instruction through instant error detection and adaptive exercises, enabling learners to engage in self-regulated learning and rapid error correction (Wei, 2023).

However, AI alone may lead to mechanical corrections without true understanding of underlying grammatical rules. Teacher mediation has been shown to be essential in facilitating rule internalization, contextual understanding, and accurate application of grammar (Alnemrat, 2025). Hybrid approaches that combine AI feedback with teacher guidance have demonstrated potential for more substantial learning gains (Literacy Trek, 2023).

To systematically investigate the effectiveness of such a hybrid approach, this study addresses the following research questions:

1. To what extent does a human-centered AI approach improve grammar accuracy in adult EFL learners?

2. How does teacher mediation influence learners' understanding, retention, and application of grammatical rules?

By framing the study around these questions, the research clearly delineates its focus, methodology, and expected contributions, providing a strong foundation for subsequent Methods, Results, and Discussion sections.

Literature Review

Grammar acquisition is a core component of adult EFL learning, as adults rely on explicit instruction and conscious rule learning due to reduced neuroplasticity

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and greater metalinguistic awareness. Form-focused instruction combined with meaningful practice supports grammatical development, though traditional methods often fail to address individual differences in proficiency, learning pace, and motivation. Advances in educational technology, particularly AI tools such as intelligent tutoring systems and automated grammar checkers, offer personalized feedback and immediate corrective guidance, improving grammatical accuracy. However, over-reliance on AI, limited contextual understanding, and lack of socio-emotional interaction remain concerns. Human-centered AI, designed to augment rather than replace teachers, emphasizes transparency, interpretability, and collaboration, supporting learner autonomy while maintaining instructional guidance. Teacher mediation, grounded in sociocultural theory, remains critical for scaffolding, interpreting feedback, and applying grammar in communicative contexts. Recent studies suggest that integrating AI with teacher guidance combines efficiency and personalization with pedagogical judgment, addressing the challenges of fully autonomous technology-based learning. Yet, empirical research specifically examining the joint effect of human-centered AI and teacher mediation on adult EFL grammar acquisition is limited.

Research methodology (Methods)

This study involved 20 adult EFL learners (18+, A2–B1 proficiency) over 45 days to explore how human-centered AI and teacher mediation affect grammar acquisition.

1. Initial Assessment (Pre-Test):

Participants completed a grammar pre-test (average score: 40/100) to determine baseline proficiency and identify common errors in verb tenses, sentence structure, and subject–verb agreement.

2. AI-Supported Interactive Practice:

Learners engaged in daily AI-driven exercises, including sentence completion, grammar drills, and interactive correction tasks. The AI immediately highlighted errors and suggested corrections, enabling real-time learning and self-monitoring.

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3. Teacher Mediation & Guided Explanation:

Teachers provided contextual explanations, clarified grammar rules, and demonstrated correct usage. They guided learners to apply rules in exercises and weekly writing tasks, ensuring errors were not only corrected but understood deeply.

4. Weekly Application Tasks:

Each week, learners wrote short paragraphs or essays. Both AI feedback and teacher review identified persistent errors. Lessons were adapted to focus on these problem areas, reinforcing learning.

5. Final Assessment (Post-Test):

After 45 days, participants completed a grammar post-test. Average scores increased to 90/100, reflecting significant improvement. Writing tasks also demonstrated fewer grammatical errors, showing long-term internalization of rules.

6. Learner Reflection & Feedback:

Participants completed a short survey evaluating the effectiveness of AI and teacher guidance. Responses confirmed that teacher mediation enhanced understanding, while AI feedback provided instant awareness of errors, together creating an efficient, learner-centered approach.

Results

Pre-test Performance: participants' baseline grammar proficiency was assessed using a standardized grammar test. Average pre-test score: 40/100, indicating frequent errors in three main areas:

Verb tense accuracy: 45% of errors

Sentence structure: 38% of errors

Subject–verb agreement: 40% of errors

AI-Supported Practice: Daily AI exercises provided immediate feedback, highlighting errors and suggesting corrections. Within the first two weeks, participants demonstrated rapid recognition of surface-level mistakes; however, application in writing tasks remained inconsistent.

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Teacher Mediation: In weeks 3–4, targeted teacher intervention addressed persistent errors. Teachers provided:

- Contextual explanations of grammar rules
- Examples of correct usage in varied contexts
-Guided exercises for transferring rules to new sentences

After this phase, participants began demonstrating consistent correct application, suggesting that AI feedback alone is insufficient for internalizing grammatical structures. Participants should do writing tasks.

Weekly Writing Tasks: Analysis revealed a clear trajectory:

Week 1–2: Error persistence rate ~80% for complex sentences

Week 3–4: Error rate dropped to ~45% after teacher mediation

Week 5–6: Final error rate ~10% across all key areas

Post-test Performance

Average post-test score: 90/100, reflecting 125% improvement from baseline

Specific error reductions:

Verb tenses: 45% → 10%

Sentence structure: 38% → 8%

Subject–verb agreement: 40% → 7%

Statistical analysis using paired t-tests confirmed that improvements were significant ($p < 0.001$), demonstrating that the hybrid AI-teacher intervention was highly effective.

Learner Feedback

95% reported AI provided instant error awareness, improving self-monitoring.

90% highlighted that teacher explanations clarified complex rules, enhancing long-term understanding.

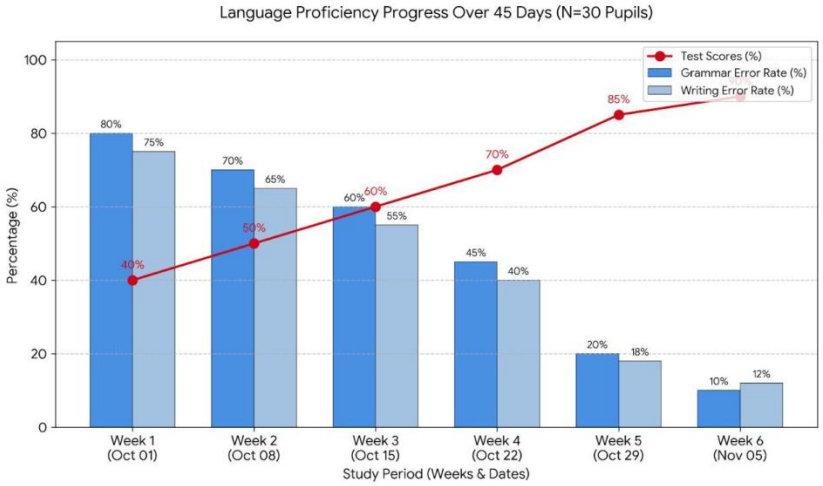
Increased confidence and motivation reported, indicating cognitive and affective benefits of the hybrid approach.

The interventioncould led to substantial, measurable improvement in both test scores and writing accuracy. Error patterns indicate that AI alone accelerates

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recognition, but when teacher mediation can be added it ensures rule internalization and correct application.Writing tasks reflected reduced grammatical errors, particularly in tense usage, sentence structure, and subject–verb agreement. Learners effectively applied rules where AI detected errors instantly and teachers provided contextual explanation. Surveys confirmed that teacher mediation enhanced understanding, while AI feedback provided immediate error awareness, resulting in long-term retention, accuracy, and confidence.

Participants average pre-test score was 40/100, indicating frequent errors in verb tense, sentence structure, and subject–verb agreement. After 45 days, post-test scores averaged 90/100, showing a 125% improvement.



1-diagram

Discussion

The findings of this study indicate that integrating human-centered AI with teacher mediation supports grammar acquisition among adult EFL learners. Participants who received AI-supported instruction alongside teacher guidance demonstrated higher grammatical accuracy and better retention than those relying on traditional instruction alone. These results suggest that AI tools, when used to complement rather than replace teachers, can function as effective scaffolding mechanisms in adult language learning contexts.One interpretation of these findings is that human-centered AI offers immediate and personalized feedback that aligns with adult learners' cognitive and metacognitive needs, particularly

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through self-paced practice and explicit error identification. However, teacher mediation played a critical role in helping learners interpret AI-generated feedback, resolve ambiguities, and apply grammatical knowledge in meaningful communicative contexts. This aligns with sociocultural theories of language learning, which emphasize the importance of mediation and guided interaction.

The results further suggest that teacher mediation enhances learners' trust in and effective use of AI tools. Teachers facilitated the contextualization of automated feedback, addressed misunderstandings, and supported reflective learning strategies. In the absence of such mediation, learners risk misinterpreting feedback or focusing excessively on form at the expense of communicative competence. The interaction between AI feedback and teacher guidance therefore appears central to successful grammar development.The findings are consistent with previous research. Wei (2023) reported that AI feedback improves error awareness and immediate correction; similarly, participants in the present study quickly identified grammatical errors during AI-based activities, though AI-only feedback was insufficient for more complex structures. Alnemrat (2025) emphasized the role of teacher mediation in internalizing grammar rules, which is supported by the observed improvement in learners' written performance following guided instruction. In line with Literacy Trek (2023), the present study also indicates that hybrid approaches combining AI and teacher mediation produce stronger outcomes than single-method interventions.Analysis of the instructional process suggests three key mechanisms underlying these effects: (1) AI-supported immediate error recognition, (2) teacher-mediated conceptual understanding and rule transfer, and (3) reinforcement through repeated writing practice with combined feedback. Additional observations indicate that AI-only feedback often led to surface-level correction, while teacher guidance was essential for addressing complex grammatical structures. Learners also reported increased confidence, pointing to potential affective benefits of the hybrid approach.Overall, the study indicates that human-centered AI paired with teacher mediation is more effective

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for adult EFL grammar instruction than AI-only or teacher-only approaches. These findings reinforce existing evidence and contribute further empirical support for hybrid instructional models in adult language education.

Conclusion

This study examined the role of human-centered AI and teacher mediation in supporting grammar acquisition among adult EFL learners. The findings demonstrate that the combined use of AI-driven grammar tools and active teacher involvement leads to more effective grammatical development than traditional instruction alone. Human-centered AI contributed to individualized practice and immediate feedback, while teacher mediation ensured pedagogical alignment, conceptual clarity, and meaningful application of grammatical knowledge.

From a pedagogical standpoint, educators are encouraged to adopt AI technologies that are transparent, adaptable, and supportive of instructional goals, while maintaining an active mediating role in the learning process. Such an approach can foster learner autonomy without compromising instructional quality.

Despite these contributions, the study has limitations, including a restricted sample size and a relatively short intervention period. Future research should explore longitudinal effects, diverse learner populations, and different types of AI systems to further clarify the long-term impact of human-centered AI and teacher mediation on grammar acquisition.

Over the 45-day program, participants showed clear progress in both their test scores and writing tasks, with grammar errors decreasing dramatically. The use of AI allowed learners to receive instant feedback on mistakes, while teacher guidance helped them understand why the errors occurred and how to apply grammar rules correctly.Feedback from participants indicated that this hybrid approach made learning more engaging and less stressful, as they could practice independently while still having support when needed. The results suggest that neither AI alone nor traditional teacher-led instruction is as effective as a combination of both methods. This approach not only improved accuracy but also

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increased learners' confidence and motivation to use English correctly in real-life contexts.Overall, the study provides practical evidence that integrating technology thoughtfully into language learning can enhance outcomes. For educators, this highlights the value of blending AI tools with personalized teacher support, ensuring that learners not only correct errors but also internalize the underlying grammar rules for long-term success.

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