



Original Article

AI-Assisted Learning on Students' Grammar: Improvement and Learning Experience

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Abstract:

This study aims to investigate the use of AI-assisted learning with authentic Sustainable Development Goals (SDGs)-based materials to improve students' grammar and learning experiences. The study employed an explanatory sequential mixed-methods design. Data were collected through a grammar pretest and posttest to assess students' understanding of the Simple Past Tense and a Likert-scale questionnaire to explore students' learning experiences. The participants were 36 eleventh-grade students at SMA Persada Bandar Lampung. Data analysis included paired sample t-test analysis and N-Gain score calculation to measure grammar improvement, as well as descriptive analysis of students' responses. The results indicated that students' grammar achievement improved after the implementation of AI-assisted learning. Students reported positive learning experiences and perceived AI and SDGs-based materials as helpful and engaging, although some interaction difficulties still happened. The findings suggest that AI-assisted learning with authentic materials had potential to enhance grammar learning. However for optimal outcomes, longer implementation of the learning was needed.

Keywords: AI-assisted learning, grammar learning, SDGs-based materials, EFL students, learning experience

Introduction

Grammar is a fundamental component of language that provides structural rules enabling clear and meaningful communication. Without grammatical organization, language may become fragmented and difficult to understand (Qizi, 2023). Recent perspectives emphasize that grammar should not be viewed merely as a set of prescriptive rules but as a functional system supporting communicative competence and meaningful interaction in language use (Ghafar & Sawalmeh, 2023). English as a Foreign Language (EFL) learners, students' grammar plays a crucial role in developing linguistic accuracy,

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coherence, and effective expression in both spoken and written communication (Sukur, 2021). Despite its importance, grammar learning remains challenging in Indonesian EFL contexts. Traditional instructional practices frequently rely on rule memorization and mechanical exercise, resulting in limited conceptual understanding and low student engagement (Mustakim et al., 2025). Previous studies have shown that students' silence in EFL classrooms is often associated with limited grammatical competence, anxiety, and lack of confidence when using English (Widi Pratolo et al., 2024; Zafarina, 2022). These findings indicate an urgent need for innovative instructional approaches that not only improve grammatical knowledge but also foster active participation and positive learning experiences.

One promising approach is the integration of authentic materials connected to global issues such as the Sustainable Development Goals (SDGs). Authentic materials expose learners to real-world language use and help contextualize grammar within meaningful communication (Faiz, 2023). Research demonstrates that incorporating SDGs into EFL learning enhances students' engagement, critical thinking, and language development by linking classroom learning with real societal issues (Astawa et al., 2024; Azizah et al., 2025). However, authentic materials may also present challenges related to complexity and unfamiliar contexts, which can hinder comprehension if not properly supported (Alamri, 2025).

Recent technological developments, particularly Artificial Intelligence (AI), offer new opportunities to address these limitations. AI enables adaptive and personalized learning by providing immediate feedback and individualized support (Gligorea et al., 2023). Studies have reported that AI-assisted learning improves grammatical accuracy and encourages learner engagement through interactive feedback mechanisms (Teng, 2024; Yener & Selcuk, 2024). Through real-time responses, AI allows learners to notice grammatical forms during meaningful interaction, aligning with Noticing Theory, which highlights conscious attention as a key factor in language acquisition (Schmidt, 1990). Although research on AI, authentic materials, and SDG integration has increased, most studies examine these elements separately. Limited research has explored how AI-assisted learning combined with authentic SDGs-based materials can support grammar learning within the Indonesian EFL context. This gap highlights the novelty of the present study, which integrates AI technology with authentic global-content materials to create contextualized grammar instruction while simultaneously examining students' learning experiences.

Therefore, this study aims to investigate whether AI-assisted learning using authentic SDGs-based materials improves students' grammar and to explore students' learning experiences during its implementation at SMA Persada Bandar Lampung. The study is expected to contribute to innovative, technology-enhanced grammar teaching practices that promote both linguistic development and meaningful classroom engagement.

Methods

This study employed a mixed-methods design using an explanatory sequential approach, in which quantitative data collection was followed by qualitative exploration (Creswell & Creswell, 2018). The quantitative phase applied a one-group pretest–posttest design to examine students' grammar achievement before and after AI-assisted learning integrated with authentic SDGs-based materials, while qualitative data supported the interpretation of students' learning experiences (Doyle et al., 2020). The research was conducted at SMA Persada Bandar Lampung from October to November 2025. The study involved 36 Grade XI students selected purposively based on reported difficulties in

learning grammar (Gliner et al., 2017; Besekar et al., 2024). Data were collected across five meetings consisting of a pretest, three instructional sessions implementing AI-assisted SDGs-based learning, and a posttest followed by questionnaire distribution (Xu & Li, 2022).

The grammar test functioned as both pretest and posttest and consisted of multiple-choice items assessing the form, meaning, and use of the Simple Past Tense (Magdalena et al., 2021; Maric et al., 2023). Students' perceptions were measured using a 12-item questionnaire adapted from the Technology Acceptance Model (TAM), covering Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) on a five-point Likert scale. Interpretation of questionnaire mean scores was conducted using interval-based categories ranging from strongly disagree to strongly agree to support clearer descriptive interpretation (Alkharusi, 2022).

Quantitative data were analyzed using SPSS Statistics 25. The study tested the hypotheses: H_0 , that there is no significant improvement in students' grammar, and H_1 , that there is a significant improvement after AI-assisted learning with SDGs-based materials. Despite potential normality violations, a paired-sample t-test at a 0.05 significance level was used because it is robust for small sample sizes and appropriate for pretest–posttest comparisons (Habibzadeh, 2024; Talikan et al., 2025). N-Gain scores were calculated to measure the magnitude of learning improvement (Fauziyah et al., 2020). Questionnaire data were analyzed descriptively and integrated with quantitative findings to support the interpretation of students' learning experiences (Hmoud et al., 2025).

Results

Students' Grammar

The quantitative results were obtained from the comparison between pretest and posttest scores to examine students' grammar achievement after the implementation of AI-assisted learning integrated with SDGs-based materials. The results of the paired sample t-test are presented in Table 1.

Table 1. Paired t-Test

	Mean	Std.Deviation	N	Sig. (2-tailed)
Pretest	22.83	9.863	36	.000
Posttest	37.81	9.248	36	

Source: Output SPSS Statistics 25

The results show that the significance value (Sig. 2-tailed) was 0.000, below the 0.05 threshold. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. This indicates a statistically significant improvement in students' grammar, with mean scores increasing from 22.83 in the pretest to 37.81 in the posttest.

Table 2. N-Gain Score

	N	Min	Max	Mean	Std. Dev.
Ngain_Score	36	.02	.92	.6009	.18931
Ngain_Persentase	36	2.22	92.31	60.0902	18.93080
Valid N (listwise)	36				

Source: Output SPSS Statistics 25

The N-Gain analysis showed a mean score of 0.6009 (60%), indicating a moderate

level of improvement. This result suggests that AI-assisted learning with SDGs-based materials contributed positively to students' grammar, although the improvement did not reach a high level.

Students' Perception

Table 3. Students' Perceptions of AI-Assisted Learning

Category	Mean Score	Interpretation
Perceived Usefulness (PU)	3.80	Agree
Perceived Ease of Use (PEOU)	3.70	Agree
Average Score	3.75	Agree

Source: Excel Office LTSC 2021

The results in Table 3 indicate that students generally agreed with the statements related to AI-assisted learning using SDGs-based materials. The mean scores for Perceived Usefulness (3.80) and Perceived Ease of Use (3.70) fall within the "Agree" category, showing that students found the learning intervention beneficial and relatively easy to use. The overall average score of 3.75 further confirms that students had a positive perception of AI-assisted learning in grammar instruction.

Discussion

This study investigated the effectiveness of AI-assisted learning integrated with SDGs-based materials in improving students' grammar and explored their learning experiences. The findings show that AI-assisted learning contributed to significant grammar improvement, although the level of N-Gain remained moderate, indicating that grammar development occurs gradually. From the perspective of Noticing Theory (Schmidt, 1990), this improvement may be explained by learners' conscious attention to grammatical forms. The immediate feedback provided by AI likely enhanced students' attention to form and helped them notice gaps between their output and target structures. Such noticing supports grammatical development, but sustained practice is still necessary to further improve students' grammar.

The use of SDGs-based materials contextualized grammar within meaningful communication. Authentic texts expose learners to real-world language use, which can increase engagement and deepen understanding of grammar in context (Gilmore, 2019). However, the complexity of authentic materials may also limit rapid improvement within a short instructional period. Students' perceptions further reinforce these findings. They generally regarded AI-assisted learning as useful and easy to use, consistent with the Technology Acceptance Model (Davis, 1989). Positive perceptions likely supported engagement during the learning process. Nevertheless, some challenges related to technological familiarity and cognitive demands indicate that effective implementation requires appropriate guidance and scaffolding. These findings suggest that AI-assisted learning integrated with authentic materials functions as a supportive instructional approach that enhances grammatical awareness and engagement. Its effectiveness depends on systematic implementation and sufficient learning time rather than instant technological intervention.

Conclusion

This study concludes that the integration of AI-assisted learning with authentic SDGs-based materials improves students' grammar achievement. The findings indicate that students showed better performance after the implementation of the learning treatment, demonstrating measurable progress in their grammar understanding. Although the level of improvement was categorized as moderate, the results confirm that the use of AI-assisted learning contributed positively to students' learning outcomes within the limited instructional period.

In addition, students responded positively to the learning process. Most of them perceived AI-assisted learning as helpful, engaging, and supportive in developing their grammar skills. While a small number of students expressed neutral or less positive responses regarding learning efficiency and clarity of interaction, the results indicate that AI-assisted learning created a supportive and engaging learning environment and supported students' grammar development.

Suggestion

The findings of this study imply that AI-assisted learning integrated with authentic SDGs-based materials can be considered as an alternative approach in grammar instruction for EFL learners. The results show that the use of AI in combination with meaningful real-world topics supports students' grammar improvement and encourages positive learning experiences. Effective implementation requires clear guidance, structured activities, and adequate technological support to ensure that AI functions as a supportive tool while the teacher remains central in facilitating learning. Further exploration with broader participants and longer implementation periods may provide deeper understanding of how AI-assisted learning can better support students' grammar development.

References

- Alamri, W. (2025). Evaluating the benefits and challenges of using authentic materials in EFL context for listening purpose. *Frontiers in Education*, 10(8):1–9. <https://doi.org/10.3389/feduc.2025.1611308>.
- Alkharusi, H. (2022). A descriptive analysis and interpretation of data from Likert scales in educational and psychological research. *Indian Journal of Psychology and Education*, 12(2):13–16.
- Astawa, N. L. P. N. S. P., Santosa, M. H., Artini, L. P., & Nitiasih, P. K. (2024). Sustainable development goals in EFL students' learning: A systematic review. *Pegem Journal of Education and Instruction*, 14(2):1–11. <https://doi.org/10.47750/pegegog.14.02.01>.
- Azizah, N. L., Mustofa, A., & Retnaningdyah, P. (2025). Sustainable development in English language teaching: Prevailing trends, challenges, and outcomes. *English Education and Human Development Journal*, 10(1):1–16. <https://doi.org/10.33086/ehdj.v10i1.6763>.
- Besekar, S., Jogdand, S., & Naqvi, W. (2024). Exploring sample size determination in educational research: A comprehensive review. *F1000Research*, 13(527):1291. <https://doi.org/10.12688/f1000research.141173.3>.
- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, Thousand Oaks.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3):319–340. <https://doi.org/10.2307/249008>.
- Doyle, L., McCabe, C., Keogh, B., Brady, A., & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. *Journal of Research in Nursing*, 25(5):443–455. <https://doi.org/10.1177/1744987119880234>.
- Faiz, A. (2023). The impact of integrating authentic materials on learner engagement and

- language development. *Transformational Language Literature and Technology Overview in Learning (Transtool)*, 2(4):1–7. <https://doi.org/10.55047/transtool.v2i4.1378>.
- Fauziyah, E. I., Praherdhiono, H., & Ulfa, S. (2020). Efektivitas penggunaan video dengan pengayaan tokoh dan animasi terhadap pemahaman konseptual siswa. *JKTP: Jurnal Kajian Teknologi Pendidikan*, 3(4):448–455. <https://doi.org/10.17977/um038v3i42020p448>.
- Ghafar, Z. N., & Sawalmeh, M. H. M. (2023). Usage of language games to facilitate grammar learning to ESL and EFL students: A literature review. *Journal of World Englishes and Educational Practices*, 5(2):11–16. <https://doi.org/10.32996/jweep.2023.5.2.2>.
- Gilmore, A. (2019). Materials and authenticity in language teaching. In S. Walsh & S. Mann (Eds.), *The Routledge Handbook Of English Language Teacher Education*. Routledge, London.
- Gligorea, I., Cioca, M., Oancea, R., Gorski, A. T., Gorski, H., & Tudorache, P. (2023). Adaptive learning using artificial intelligence in e-learning: A literature review. *Education Sciences*, 13(12):1216. <https://doi.org/10.3390/educsci13121216>.
- Gliner, J. A., Morgan, G. A., & Leech, N. L. (2017). *Research Methods in Applied Settings: An Integrated Approach to Design and Analysis*. Routledge, New York.
- Habibzadeh, F. (2024). Data distribution: Normal or abnormal? *Journal of Korean Medical Science*, 39(3):e35. <https://doi.org/10.3346/jkms.2024.39.e35>.
- Hmoud, M., Daher, W., & Ayyoub, A. (2025). From experience to engagement: A mixed methods exploration of learning environments using artificial intelligence and extended reality. *Frontiers in Education*, 10(1):1–10. <https://doi.org/10.3389/feduc.2025.1617132>.
- Magdalena, I., Syariah, E. N., Mahromiyati, M., & Nurkamilah, S. (2021). Analisis instrumen tes sebagai alat evaluasi pada mata pelajaran SBdP siswa kelas II SDN Duri Kosambi 06 Pagi. *Nusantara: Jurnal Pendidikan dan Ilmu Sosial*, 3(2):276–287.
- Maric, D., Fore, G. A., Nyarko, S. C., & Varma-Nelson, P. (2023). Measurement in STEM education research: A systematic literature review of trends in the psychometric evidence of scales. *International Journal of STEM Education*, 10(1):1–15. <https://doi.org/10.1186/s40594-023-00430-x>.
- Mustakim, Nur Musfirah Jaya, & Umiyati Jabri. (2025). Challenges in grammar learning among EFL students: A case study of an Indonesian university. *Scope of English Language Teaching, Literature and Linguistics*, 8(1):16–27. <https://doi.org/10.46918/seltics.v8i1.2598>.
- Qizi, D. A. A. (2023). The role of grammar in learning English language. *American Journal of Social Sciences and Humanity Research*, 3(5):118–122. <https://doi.org/10.37547/ajsshr/Volume03Issue05-21>.
- Schmidt, R. W. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11(2):129–158. <https://doi.org/10.1093/applin/11.2.129>.
- Silvester Goridus Sukur. (2021). The importance of grammar in SMA English textbooks in Indonesia to promote students' linguistic competence. *Journal of English Language and Pedagogy*, 4(1):96–104.
- Talikan, A. I., Salapuddin, R., Aksan, J. A., Rahimulla, R. J., Ismael, A., Jimlah, R., Idris, N., Dammang, R. B., Jamar, D. A., Sarahadil, E., & Ajan, R. A. (2025). On paired samples t-test: Applications, examples and limitations. *Ignatian International Journal for Multidisciplinary Research*, 2(1):1–12. <https://doi.org/10.5281/zenodo.10987546>.
- Teng, M. F. (2024). “ChatGPT is the companion, not enemies”: EFL learners' perceptions and experiences in using ChatGPT for feedback in writing. *Computers and Education: Artificial Intelligence*, 7:100270. <https://doi.org/10.1016/j.caeai.2024.100270>.
- Widi Pratolo, B., Sakti, M. M. A., & Bao, D. (2024). Exploring factors influencing student silence in EFL classes: A case study at an Indonesian vocational high school. *English Language Teaching Educational Journal*, 7(1):55–64.

<https://doi.org/10.12928/eltej.v7i1.10596>.

- Xu, J., & Li, C. (2022). Timing of form-focused instruction: Effects on EFL learners' grammar learning. *Studies in Second Language Learning and Teaching*, 12(3):405–433. <https://doi.org/10.14746/ssl.2022.12.3.4>.
- Yener, B. B., & Selcuk, H. (2024). AI-assisted grammar learning: Improving present perfect tense proficiency in EFL students. *The Literacy Trek*, 10(3):339–361. <https://doi.org/10.47216/literacytrek.1556837>.
- Zafarina, N. F. (2022). Silent learners' voices: Exploring the silence behavior in Indonesian EFL classroom. *Journal of English Language Teaching and Linguistics*, 7(2):1–10. <https://doi.org/10.21462/jeltl.v7i2.846>.