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THE IMPACT OF AI-ASSISTED FEEDBACK ON ESL STUDENTS' GRAMMAR LEARNING: A PRE- AND POST-TEST STUDY

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Abstract
This research study investigates the impact of AI assisted diagnostic feedbacks (using ChatGPT) on the grammar identification skills of English as a second language learners (aged 8-9) in grade 3.Recognizing the challenges faced by ESL learners in accurately identification of grammatical elements (nouns, adverbs and verb forms) and the practical limitations of providing individualized real time feedback in traditional classrooms, this study addresses the critical gap by comparing AI generated feedback with traditional assessment. The researchers have conducted mixed method research using Quasi- experimental research. The study involves selecting 50 students using non probability sampling. Single group pre-test/intervention/post-test design was employed over a two-week period. Initial performance on 15-item identification resulted in a mean score of M=7.20(48% accuracy). During the intervention, students received real time, diagnostic AI feedback on their errors, along with corrective explanations and reinforced learning. Post-test results demonstrated a significant improvement, with the mean increasing to M = 12.54 (84% accuracy) and an average gain of +5.34 points. Statistical analysis shows the significance of this improvement ($t = 13.32$, $p < .05$), with a large effect size (Cohen's $d = 1.44$). Qualitative findings revealed that AI feedback was especially effective in clarifying complex grammatical categories such as manner adverbs, verb forms, and uncountable nouns. The study concludes that AI-assisted feedback can serve as a highly effective tool for enhancing foundational grammar skills among young ESL learners. However, concerns about excessive reliance on AI and lack of emotional nuance still exist.

Keywords: *ESL Grammer Learning, Ai-Assisted Feedback, Diagnostic Feedback, English as Second Language (ESL), Foundational Grammer Skills.*

Introduction

In recent years, the rapid advancement of AI in the field of educational technology, especially in the field of Second Language Acquisition had brought a significant change in pedagogical discussions. The evolution of these sophisticated Large Language Models (LLMs) allows learners

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to more from more generalized classrooms instruction towards personalized learning experiences. Despite these technological advancements, mastering foundational grammar still remains a persistent challenge for ESL learners. Specifically, young students (ages 8-9) often struggles with identifying core grammatical elements such as nouns, verbs and adverbs which are essential for language fluency. Researchers have constantly highlighted that effective learning occurs when targeted, real time and insightful feedback is provided that guides students towards self-correction (Hattie & Timperley, 2007). However, in traditional classrooms it is impractical to give individualized and timely feedback due to class size and teacher's workload.

Therefore, this study addresses the critical gap between the need for immediate, real time grammar feedback. Using CHATGPT as an intervention tool, this research aims to compare AI-generated diagnostic feedback with traditional feedback to enhance the learning outcomes. Therefore, this study aims to assess the influence of AI assisted feedback protocols on the grammar identification skills of class 3 students both qualitatively and quantitatively. To achieve these goals, the study seeks to answer the following research questions:

To what extent students of grade 3 can accurately identify types of nouns, adverbs, and verb forms using traditional pen and paper methods?

How effectively does AI- generated feedback (ChatGPT) correct students grammatical errors and support their understanding of nouns, adverbs and verb forms?

What improvement if any, is observed in student's grammar identification performance after receiving AI- assisted feedback compared to their initial response?

The study reported in this paper investigated the impact of AI driven feedback on grade three students by comparing traditional assessment and AI assessed feedbacks.

Literature Review

Artificial Intelligence (AI) in language learning has altered the previous structures of teaching grammar, especially among young ESL students that need to scaffolding, corrected instantly, and the explanations to be simplified. The acquisition of grammar at basic level (particularly with regard to a group of words like nouns, verbs, and adverbs) would need exposure, corrective feedback, and practice. It is agreeable among scholars that the grammatical acquisition of young learners is very sensitive to the type and quality of feedback they are provided (Hattie and Timperley, 2007). In traditional classroom contexts, however, due to restricted teaching time and large student to teacher ratio, teachers cannot supply more frequent and individualized feedback. That gap has created a growing interest in AI-based feedback systems with the ability to provide prompt, customized, and context-sensitive assistance.

Artificial Intelligence Feedback and Its Application in Foundational Grammar Learning

Studies suggest that AI-based systems can be effective in cases of lower-grade students who have difficulties with the early grammar concepts because of the developmental stages of cognitive functioning and weak metalinguistic awareness (Sari and Lestari, 2025). Adverbs of manner, nouns that cannot be counted and irregular past tense verbs are some of the grammatical forms that are usually misidentified by young ESL students. These mistakes are usually caused by the fact that young learners are dependent on superficial messages (e.g., word endings or common words) but not on conceptual linguistic principles. It has been demonstrated that the gap can be filled by Intelligent Tutoring Systems (ITS) and conversational AI based on LLM such as ChatGPT which can deconstruct grammatical ideas into simplified explanations based on the response patterns of the learner (Winkler and Siler, 2020).

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AI feedback has three significant roles in grammar learning:

1. Diagnosis, in which the AI finds out the wrong classifications;
2. Correction, in which the system provides reasons of the mistake; and
3. Reinforcement, in which the system is used to provide more examples of the rule.

Yin, Xu, Pan and Hu (2025) assert that AI feedback reinforces self-regulated learning abilities as it allows learners to recognize the holes in their knowledge, and rectify any mistakes on their own. These methods are consistent with constructivist theories that focus on active involvement of learners and instant engagement with the material, which are vital in case of young ESL students who need to be exposed to the same material several times to master grammar rules fully.

Studies of Grammar-Specific AI Support

The research investigating grammar-based AI interventions demonstrates the constant increase in accuracy and rule recollection. In the meta-analysis of automated feedback systems, Fleckenstein et al. (2023) discovered that there were significant improvements in grammatical proficiency in students whose explanations were constantly and personally delivered. Their impact was especially high on grammatical categories that imply the conceptual distinction, e.g. The distinction between the types of nouns (proper, common, collective), verb tenses, and the adverbial categories. These results were consistent with previous studies by Godwin-Jones (2022) who claimed that AI-based explanations can help to explain linguistic relationships that students tend to misunderstand when they can utilize rote learning alone.

Young ESL students often conflate collective nouns (e.g., team, class), uncountable nouns (e.g., water, rice, milk), or adverbs of manner (e.g., happily, proudly, quickly) with either adjectives or verbs. These tendencies are well established in earlier studies of grammar acquisition, errors made in this process are frequently due to overgeneralization or lack of exposure to real world use. AI systems promote functional learning and discourage memorization of rules by providing contextualized explanations, including the definition of happy to say how children played.

AI as a Method of Instant, Personalized Feedback

Timely feedback is among the best predictors of learning enhancement especially in introductory courses (Hattie, 2007). Classroom feedback is usually traditional and slows down correction effectiveness among young students who need to be corrected within a short time. AI systems do not have this delay because the response of students is analyzed immediately and clarified in time. Cuellar et al. (2025) found out that AI-mediated interventions bring about engagement and motivation among young learners as the tech is conversational and interactive. This can be used especially with children of 8-9 years of age when they react well to active tools of teaching and individualized feedback.

Besides the ability to correct errors, AI offers consistent feedback that is also unbiased; the latter is quite hard to achieve with a large group of students. According to Schneider et al. (2023), such consistency provides the learners with a consistent base of grasping grammar principles, which helps to prevent confusion and contributes to independent correction. The more students engage with AI explanations, the stronger their conceptual knowledge becomes, and they start to gain learning which is observable in the follow-up assessments or post-tests.

Empirical Evidence Assisted by AI in Pre-Test/Post-Test Gains

The studies that utilize pre-test/intervention/ post-test design like the one employed in the present study all show a consistent result of significant improvements in grammar performance

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following AI-assisted learning. According to Bobbitt (2021), pre-test/post-test models are effective to conduct tests to determine changes in accuracy, comprehension, and knowledge retention. Moss Group (2024) also stresses that the comparison of pre- and post-intervention scores will help understand whether the desired learning outcomes are met and that the intervention is relevant, particularly when the instructional tool is the AI feedback.

Research on ESL students in primary schools tends to suggest the same tendencies:

- Original flaws in adverbs and verbs forms as a result of conceptual complexity.
- Moderate scores on the recognition of common and proper nouns.
- Great after-intervention results besides AI-generated feedback.

These trends are more in line with the results of the current work, which also revealed the most significant improvements in adverbs (+ 30%) and verb forms (+ 32%), the areas in which AI explanations seemed to clear up the role of grammatical forms in the sentence context.

Theoretical Basics of AI-Assisted Learning

Theories in feedback, cognitive apprenticeship, and intelligent tutoring systems contribute a lot to the effectiveness of AI-assisted grammar instruction. According to Hattie and Timperley (2007) the effective feedback should respond to three questions as follows: Where am I going? How am I going? and Where to next? These principles are applied in AI systems as the correct answers are recognized, and the mistakes are pointed out in order to make the learners improve the performance. Winkler and Siler (2020) further explain that AI systems use rule-based reasoning to reveal why an answer is not correct, which helps in better understanding.

Considering sociocognitive viewpoint, AI-mediated feedback provides scaffolding that complies with the concept of Zone of Proximal Development (ZPD) offered by Vygotsky. As young learners usually need assisted learning to overcome the partiality of knowledge to the mastery, AI is a scaffold, which reacts to the errors of the students and offers explanations based on the cognitive requirements of learners.

Difficulties, Constraints and Negative Attitudes

Regardless of the benefits, researchers warn against indiscrimination with regards to the application of AI in language learning. According to Godwin-Jones (2021), relying too much on automated feedback can lead to a decrease in critical engagement among learners, who will become passive receivers of corrections. The efficiency of the mechanical nature of AI explanations is insufficient in some cases, in terms of emotional touch or adaptability to the developmental variations of students.

Generalizability issues also pertain to the cases when a study utilizes convenience samples or influences of short-term intervention. According to Cohen, Manion, and Morrison (2017), these limitations limit how well the findings can be used to generalize the results to large populations. According to DeKeyser (2007), it is important to conduct longitudinal researchers to find out whether the gains, induced by AI, last over time, particularly in the case of young learners, whose ability to hold onto abstract grammar rules, needs to be reinforced repeatedly.

Lastly, pedagogical thinkers like Garrison (2018) say that AI devices should be carefully incorporated into classroom settings, and it is up to teachers to mediate, frame, and place AI feedback to context. The best use of the AI is not by means of replacement but as a supplemented power of human instructions.

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Methodology

Sampling

Assessment of ESL students to identify nouns, adverbs, and verb forms within sentences and to examine the influence of AI feedback on their learning process was the main purpose of this study. A convenience sampling method on a Non-probability approach was used for the sampling for the research. A sampling technique in which sampling is done on non-random criteria is called Non-probability sampling which is frequently influenced by the researcher's judgment or convenience. There is no assurance of equal representation which makes this type less generalizable. However, it is relevant to real world as exploratory research or specific populations see it more practical (Nikolopoulou, 2023). The participants were the English-as-a-Second-Language (ESL) 50 students of Class 3 from Qurtuba school within the range of age 8-9 years. The basic grammar concepts, including nouns, verbs, and adverbs were introduced earlier to all students according to their proficiency level as foundational. A series of 9 sentences were provided to them and specific grammatical elements: nouns, adverbs, and verbs were asked to identify by them to assess their understanding of foundational language rules.

Materials and Instrumentation

The grammar identification task and an innovative AI feedback system were used in this study.

Grammar Identification Task

For the evaluation of students' ability to identify and properly tag exact grammatical elements, a 15-point grammar identification assessment was designed. The students were required to identify various types of nouns (countable, uncountable, and proper), adverbs (of time, place, and manner), and simple verb forms (present, past, and perfect) in following nine sentences. The sentences used for assessment are given below:

1. Ali plays football every day.
2. Children played happily in the park.
3. Water gives life to all living things.
4. She wrote a letter yesterday.
5. They have gone to the market tomorrow.
6. Rice is cooked slowly in the kitchen.
7. The team won the match proudly.
8. Sara reads hard at night.
9. Milk was poured quickly into the cup.

AI Feedback

The tool used for assessment was an advanced Large Language Model (LLM), an AI Chatbot: ChatGPT. Learning is enhanced by AI-driven chatbots which provide adaptive content, instant feedback, and personalized experience for guidance according to demands and needs. Instant feedback offers real time suggestions for improvement and progress as learners feel more in control of their learning process. supports self-regulated learning by helping learners become more competent about identification of gaps, correcting errors, and become more intrinsically motivated. On the whole, feedback is necessary to deeper the understanding of concepts, and fosters a sense of progress which motivates students to continue learning leading to improved performance (Yin, Xu, Pan, & Hu, 2025).

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Procedure

A pre-test/treatment/post-test design was used to address the research questions (RQ1-RQ3) within a two-week period. According to Bobbitt (2021), participants are measured before and after a treatment in a pretest-posttest design to assess change in their learning process. This design is suitable for both experimental and quasi-experimental research. At first The process involves pre-test scores are recorded then, applying a treatment is applied to the participants. Next step is that post-test scores are recorded, and lastly the differences among variables is analyzed (Bobbitt, 2021).

Pre-Test (RQ1)

To address RQ1, traditional pen-and-paper methods were used by to identify the grammar items.

Treatment (RQ2)

Students' pre-test errors were immediately incorporated in the AI. The treatment phase continued to approximately two weeks. Through AI-generated feedback providing detailed and explained corrections students reread their papers. This phase addresses the Research Question 2 (RQ2). Its focus was to evaluate the efficiency of AI-generated feedback.

Post-Test (RQ3)

After two weeks, the grammar identification task was completed again by students to assess any improvement in their proficiency level in the result of following AI feedback.

According to Moss Group (2024), comparing pre- and post-tests helps in deeper understanding of the level of comprehension of trainees and to assess proposed learning outcomes and conclusion of a treatment are aligned to each other or not.

Data Analysis

Quantitative Data Analysis

Students' performance was analyzed through the Grammar Identification Task as pre-test and post- test with the AI-assisted treatment. Pre-test and post-test scores, gain scores, and statistical tests of significance were included in quantitative analysis, on the other hand, AI feedback's diagnostic feature was evaluated in qualitative analysis. The analysis addresses RQ1 (initial performance level), RQ2 (effectiveness of AI feedback), and RQ3 (changes in performance). The quantitative data was analyzed using a *simple manual method*. To assess proficiency level of students, average means of pre-test and post-test scores were calculated.

Table 1

Pre-Test Mean

Score	Frequency	Total (Score × Frequency)
10	10	100
6	25	150
4	5	20
9	10	90

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Score	Frequency	Total (Score × Frequency)
Sum of totals = 360		
Number of students = 50		
Pre-test Mean = 360 ÷ 50 = 7.2		

Table 2

Post-Test Mean

Score	Frequency	Total (Score × Frequency)
10	9	90
15	25	375
7	6	42
12	10	120
Sum of totals = 627		
Number of students = 50		
Post-test Mean = 627 ÷ 50 = 12.54		

Interpretation

Significant progress in students' performance after the treatment had been showed due to the difference between a pre-test mean of 7.2 and a post-test mean of 12.54. The average gain within all students was 5.34 points which was determined by assessing individual gain scores subtracting each student's pre-test score from their post-test score (Gain Score = Post-test Score − Pre-test Score). As suggested by Field (2018), T-test should be conducted to ensure differences are real or due to chance. To determine whether this improvement was statistically significant, a one-sample t-test was conducted to determine the statistical significance of improvement among students.

With the standard deviation of the post-test of 2.84, t-test's t-value was 13.32 with 49 degrees of freedom. than the critical t-value at $\alpha = 0.05$ is 2.01 so t-value was far greater which showed that the improvement was greatly significant.

By using Cohen's *d* practical significance of the treatment was assessed, so Cohen's *d* was 1.44. This was a very large effect size. The improvement was not only statistically important but also had practical significance also. It suggested that the AI feedback was greatly helpful to enhance the proficiency level of students.

Qualitative analysis

Qualitative analysis was conducted to complement the quantitative results by classifying the maximum errors made by students and assessing the nature of AI. The analysis shown that the AI gave explicit clarifications and made corrections of complex areas specially with verb forms, adverbs, and uncountable nouns. The post-test scores showed the contribution of AI feedback to the proficiency level of students.

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Grammar Categorization Analysis

The reported answers of all students were calculated in the pre-test and post-test with conversion into percentage scores for comparison. The results showed strong improvement across all categories. The noun category's pre-test mean score of 58% was increased to 80% in the post-test with a gain of 22% points. The adverbs also have shown an improvement from a pre-test mean of 45% to a post-test mean of 75% with a gain of 30 %points. The verb forms were greatly improved from pre-test mean 41% to post-test mean 73%, with a gain of 32% points. The gain% of categories depicts the improvement among students' grammar skills with the support of AI-feedback.

Noun Identification Analysis

Students mostly well identify the different types of nouns (proper nouns, such as *Ali* and *Sara*). Though, the weaker students were confused and misclassified the proper nouns as common nouns. The majority of students identified the common nouns (children, *letter*, and *market)* correctly, while some still found difficulty among uncountable nouns (*water*, *rice*, and *milk*) and labelled them as countable nouns. Collective nouns (e.g. *team)*, were the hardest for students as students misclassified them as common nouns.

Adverb Identification Analysis

Students found the types of adverbs more difficult than nouns. Time adverbs (every *day*, *yesterday*, and *tomorrow)*, were understood by students slightly as *everyday* was sometimes labelled wrongly. Manner adverbs (happily, *slowly*, *proudly*, *hard*, and *quickly)* were also confused and labelled as adjectives or verbs. A frequent mislabeling was the tagging of verbs *(gives* or *wrote)* as adverbs. Overall, students found adverbs more difficult than nouns.

Results and Discussion

Interpretation of Results

Table 3 shows the grammar identification task's pre-test and post-test mean scores. The pre-test mean was 7.20 /15 (48% correctness), while the post-test means improved to 12.54 / 15 (84% correctness), so the average improvement is +5.34 points (36% gain) showing a significant progress in students' grammar identification skills after AI-assisted treatment.

Table 3

Pre-Test and Post-Test

Metric	Result (Out of 15)
Pre-Test Mean M(Pre)	7.20
Post-Test Mean M(Post)	12.54
Average Improvement	+5.34

The first performance test of students was weak but students improved a lot in second performance test as shown in analysis of grammar category (Table 2). As the illustration shows that Adverbs (+30%) and Verb Forms (+32%) has showed the substantial improvements. Hence, it depicts that AI feedback has effectiveness to explain and clarify the complex grammatical rules. There is also an improvement in Nouns (+22%).

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Table 4

Category-Specific Gains

Grammar Category	Pre-Test Mean	Post-Test Mean	Gain
Nouns	58%	80%	+22%
Adverbs	45%	75%	+30%
Verb Forms	41%	73%	+32%

AI Integration in Grammar Learning

For instant, tailored feedback, AI(ChatGPT) was incorporated in the process of training of grammar proficiency level among students. The AI evaluated the answers which were submitted by students as pre-test of grammar identification task. AI reinforced the students' learning process through a three-step method: grammar feedback, error correction, and learning reinforcement to enhance students' proficiency level of grammar skills.

In the first stage of the grammar feedback, the AI provided positive reinforcement after assessment of students' responses. And error correction. For instance, the AI replied, "Correct! 'Ali' is a proper noun because it is the name of a person." (OpenAI 2025) when a student correctly recognized "Ali" as a proper noun in the sentence "Ali plays football every day," On the contrary, when a student mislabeled the adverb "happily" as a verb in the sentence "Children played happily in the park," the AI corrected it by clarifying that "'Happily' is an adverb which describes that how the action was executed" (OpenAI 2025) and encourage the student to attempt it again. Students felt encouraged to reflect on their answers in the result of acknowledging the correct responses and identifying the mistakes.

The AI explained the reasons behind these mistakes with examples before addressing the correct responses in the error correction phase. It encourages students to reflect on their mistakes.AI clarified, "This word is a verb, not a noun. A verb shows action. For example, in 'She wrote,' the word 'wrote' tells us what she is doing," (OpenAI 2025) when student mislabeled the verb "wrote" as a noun in the sentence "She wrote a letter yesterday," stimulating the student to review their response.

Final step is learning reinforcement, in which the AI gives further explanations with the help of examples to identify other verbs and adverbs in sentences further than the original tasks. As AI exemplified that the word "quickly" is an adverb in "Milk was poured quickly into the cup," showing how the action was executed. On the whole, the incorporation of AI into grammar learning process helps in instant correction and reinforcement of the concepts related to grammar.

Examples of AI Feedback in Action

The students got guidance through AI feedback by correct identifications and highlighting the common errors. A student correctly identified *Ali* and *football* in "Ali plays football every day," but mislabeled *every day* as a noun but AI suggested positive reinforcement for the correct answers with the affirmation of "Great job! 'Ali' is a proper noun and 'football' is a common

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noun," although softly clarifies the mistake: "'Every day' is an adverbial phrase modifying the verb 'plays,' not a noun. Try identifying other adverbs in the sentence." (OpenAI 2025).

Similarly, in case of identification of adverbs, a student mislabeled *happily* as a verb in "Children played happily in the park,". The AI recognized the correct responses as "'Children' is a noun, and 'played' is a verb which describes the action," and then explained the error: "'Happily' is an adverb which tells how the action was performed. Can you find other adverbs in this sentence?" (OpenAI 2025).

The student misidentified *water* as countable in the sentence "Water gives life to all living things" while the AI suggested positive reinforcement for the correct tagging of *life* as a common noun and made correction of the error by clarifying, "'Water' is uncountable. Uncountable nouns refer to substances or concepts that cannot be counted individually. Examples include sand, rice, and milk." (Open AI 2025).

Lastly, for collective nouns, *team* was misclassified as a common noun in the sentence "The team won the match proudly,". The AI reinforced with affirmation, "'Won' is a verb and 'proudly' is a manner adverb," while clarifying the error: "'Team' is a collective noun, referring to a group treated as a single unit. Examples include family, class, and team." (OpenAI 2025).

These examples prove that AI feedback not only supports correct replies but also offers instant, positive reinforcement with detail explanations for better understanding of grammatical concepts.

AI's Role in Student Learning

The instant and tailored AI feedback can significantly improve learning results through positive reinforcement, error correction, and targeted practice (Cuéllar et al., 2025). As AI provide clear clarifications leads students to reflect on and review their work to foster deeper understanding of grammatical concepts (Sari & Lestari, 2025). Hence automated feedback systems reliably improve performance (Fleckenstein et al., 2023). Additionally, students' self-regulation is promoted through reinforcement and tailored prompts through which students have more control of their learning process (Schneider et al., 2023; Yener & Selçuk, 2024). Muneeb et al. (2024) demonstrate that, in ESL and EFL contexts, pedagogical support strategies such as mediated explanations and adaptive feedback significantly enhance learners' comprehension and grammatical development. Teachers strategically employ code-switching to scaffold learning and clarify complex grammatical concepts; similarly, AI-assisted feedback can function as an adaptive pedagogical tool that supports learners' grammatical accuracy and learner autonomy.

Theoretical Implications and Effectiveness

The core finding of this study is that there is a significant improvement in grammar proficiency level among Class 3 ESL students with the help of AI feedback. It is aligned with the literature which supports the use of Intelligent Tutoring Systems (ITS) to improve basic skills in second language acquisition. According to Godwin-Jones (2022), students get help of interactive and resourceful tools due to the technological advancements to master new languages. **Conclusion**

The study explores the impact of AI assisted diagnostic feedbacks (using ChatGPT) on the grammar identification skills of English as a second language learners by addressing the critical gap by comparing AI generated feedback with traditional assessment with help of mixed method approach using Quasi- experimental research. Statistical analysis shows the significance of this improvement ($t = 13.32$, $p < .05$), with a large effect size (Cohen's $d = 1.44$). Qualitative findings revealed that AI feedback was especially effective in clarifying complex grammatical categories

such as manner adverbs, verb forms, and uncountable nouns. The study recognizes that the use of a convenience sample from a single school leads to generalizability concerns. Questions can be raised for short-term intervention about long-term retention of grammatical skills. The suggestion for future research includes more adaptive AI systems should be developed to offer explanations based on context.

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