



Original article

The Impact of AI-Based Feedback on Enhancing the Grammatical Accuracy of EFL Learners

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ABSTRACT

The integration of Artificial Intelligence (AI) into English as a Foreign Language (EFL) instruction has garnered increasing interest due to its potential to enhance students' writing, particularly grammatical accuracy. Many EFL learners persistently struggle with grammar due to limited feedback and time constraints on instructors. This research investigates the effect of AI-based feedback on the grammatical correctness of Iraqi EFL learners' written production, comparing it directly with traditional teacher-based feedback. A mixed-methods design, incorporating quantitative and qualitative approaches, was employed for a comprehensive assessment. The sample comprised (20) fourth-year EFL students at Al-Farahidi University's English Department. Data were collected through pre- and post-writing tests, AI-generated feedback reports using Grammarly, and teacher assessments. Quantitative data were analyzed using paired-sample t-tests, while thematic analysis was applied to qualitative data. The findings indicate that AI-based feedback positively influences the enhancement of grammatical accuracy in EFL learners' writing.

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Keywords: Artificial Intelligence, quantitative and qualitative methods, Grammarly.

تأثير التغذية الراجعة المبنية على الذكاء الاصطناعي من أجل تعزيز الدقة النحوية لمتعلمي اللغة الإنكليزية كلغة أجنبية

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لُستخلص

يمثل دمج الذكاء الاصطناعي في تدريس اللغة الإنكليزية كلغة أجنبية ظاهرة حظيت باهتمام متزايد لقدرتها على تحسين عملية الكتابة لدى الطلاب، خاصة فيما يتعلق بالدقة النحوية. لا يزال العديد من متعلمي اللغة الإنكليزية كلغة أجنبية يعانون من مشاكل نحوية مستمرة بسبب محدودية التغذية الراجعة وضيق وقت المدرسين. تبحث هذه الدراسة في تأثير التغذية الراجعة القائمة على الذكاء الاصطناعي على الصحة النحوية للإنتاج الكتابي لمتعلمي اللغة الإنكليزية العراقيين، ومقارنتها مباشرة بالتغذية الراجعة التقليدية القائمة على المدرس. تم استخدام تصميم بحثي بالطرق المختلطة (الكمية والنوعية) للحصول على صورة شاملة لفعالية التغذية الراجعة عبر الذكاء الاصطناعي. تألفت عينة الدراسة من (20) طالباً من طلاب السنة الرابعة في قسم اللغة الإنكليزية بجامعة الفراهيدي. تم جمع البيانات باستخدام اختبارات كتابية قبلية وبعديّة، وتقارير تغذية راجعة. الكلمات المفتاحية: الذكاء الاصطناعي، النظرية الكمية والتحليلية والمصحح النحوي

Introduction

In a written language (English as a Foreign Language), grammatical correctness is one of the core elements of effective communication. Irrespective of its significance, grammatical structures including verb tenses, subject-verb agreement and the use of articles remain a persistent challenge to many EFL learners. Such difficulties are usually triggered by the lack of regular and person-centered corrective feedback that adversely influences the quality of writing as well as academic achievements of EFL learners. Most common and traditional way of providing remedial feedback to EFL learners has been through teacher and it can be pedagogically effective because it has limited practical constraints such as large classes, heavy teaching burdens and time constraints. Therefore, educators cannot necessarily afford to give detailed and prompt feedback on writing work done by students. The latest developments of Artificial Intelligence (AI) provided people with new tools that can give a direct and individual feedback on different writing elements. Writing assistants that are AI-powered, like Grammarly, allow learner to detect and correct grammatical mistakes in real-time. Nevertheless, there is still the issue of the credibility of (AI) feedback and the overdependence of learners on these tools. Thus, the current research is expected to investigate whether AI-based feedback can improve grammatical accuracy of writing in Iraqi EFL students and whether it can be compared to the teacher-provided feedback or not.

Problem Statement

It is not a question of simple embrace of AI-based feedback in EFL teaching without intricacies and controversies. Although (AI) programs can perform fairly well with surface-level errors, they are somewhat concerned with whether they can provide fine-grained and contextualized feedback on higher-order linguistic problems or not. Some people raise a question whether (AI) can be relied upon to provide subtle feedback of higher-order of linguistic problems or not. Critics also note that (AI) sometimes provides the user with wrong advice or it fails to recognize common errors as well as raising a question: How much can we trust these tools? That is why it turned into one of the pedagogical issues of overdependence on (AI)-based writing tools by students. Additional obstacles include biases which might be part of (AI) systems and they need to match students with how artificial intelligence is delivering feedback.

Objectives

This research aims to:

1. To explore how (AI) feedback can be used to enhance the grammatical accuracy of written productions of Iraqi EFL learners.
2. To identify the best corrective AI-based feedback type of grammatical errors related to EFL writing essays.
3. To assess the impact of AI- based feedback on grammatical accuracy as compared to teacher-provided feedback of no-feedback conditions.

Research Questions

1. Varying combination of AI-based feedback on grammatical accuracy through writing among EFL students and how it is effective.
2. Which are the precise categories of grammatical mistakes (e.g., verb tense, subject-verb agreement, articles, prepositions) and which AI-based feedback can be most or least effective with EFL students?
3. Do EFL learners with AI-based feedback are more likely to write grammatically correct essays than their feedback counterparts?

Methodology

This paper follows a mixed-method research design, which is a combination of a quantitative and qualitative approach in the sense that it will provide a holistic view of the role of AI-based feedback on the grammatical accuracy of EFL learners. The mixed-methods approach will enable the researcher to assess the objective changes in grammatical performance and investigating how learners are engaging with and perceiving AI-generated feedback. The sample population used was (20) fourth-year EFL students of the English Department, at the Al-Farahidi University College of Education. The students have been chosen by means of random sampling and had rather similar academic background and the level of English proficiency. They were placed in two experimental groups. The former group was given AI-based feedback by application of Grammarly whereas the latter group was given the corrective feedback written by the teacher. This categorization made a comparative analysis of the efficacy of AI-generated feedback and human feedback on the grammatical correctness of the learners possible. Pre- and post-writing tests, AI-generated feedback reports, and teacher evaluation rubrics were the data collection instruments. Each of the participants was also given a pre-test writing session at the start of the study in order to form a baseline measure of their grammatical accuracy. Students had to perform a few pieces of argument or expository writing tasks during the intervention period. Students of experimental groups applied AI-based feedback tools to correct their writing and get immediate corrections regarding grammatical, lexical, and mechanical mistakes, and students of experimental group on the other hand were provided with the help of the conventional written feedback of their instructor. After the intervention period, both groups were given a post-test writing task in order to evaluate the difference in grammatical accuracy. The paired-sample t-tests were used to analyze quantitative data in order to evaluate the difference between pre and post-test scores within and among groups. Moreover, the qualitative data were examined using a thematic approach in order to determine trends of how learners respond to the AI provided feedback and how they perceive the feedback of enhancing grammatical accuracy.

Literature Review

With the introduction and influence of AI, the landscape of English language teaching and learning (ELT/L) has changed drastically, and offers new revolutionary ways of addressing learning needs, increasing inclusivity, and adapting instruction to the needs of students with different needs. Studies have been conducted on the same title.

The effect of artificial intelligence-based feedback on improving the grammatical accuracy of EFL students". The purpose of the present studies is to examine the effectiveness of AI based feedback in improving students accuracy of EFL student's writing. The name of the author is Yuni Lestari UIN Raden Intan Lampung, Indonesia.

Various studies have elaborated the beneficial effect of the AI-assisted writing tools in enhancing the writing process by students in terms of content arrangement, coherence, consistency, grammar and vocabulary. They suggest association feedback in order to compare it to the one proposed by the teacher in order to allow students to follow. The main functions of AI are to detect errors and fix them and propose superior means of stating the same. These are aimed to assist students to sort out and preventing the grammatical and lexical mistakes in order to give clues to the alternative structures of a sentence that may help to enhance the overall quality of writing English. (Chen & Gong, 2025; Song & Song, 2023).

Providing a student with feedback (immediate and adaptive in nature) is one of the biggest benefits and this has encouraged students and now enables them to improve upon their language learning process by empirically seeing how they are doing and where they need more improvement in on the fly. As an example, an AI-based system of writing evaluation was introduced into the EFL classroom, where it had a positive impact on the participants regarding their language performance; these students not only recorded a significant improvement in their writing within a short period of time (i.e. 17 weeks), but they were also quite satisfied with the tool. A different investigation also found that a course that used an AI tool could reduce grammatical and lexical mistakes considerably (Mun, 2024).

However, the strength of AI-driven feedback is not absolute because it is complicated and it is limited. AI is much more efficient in identifying and rectifying superficial issues, like grammar, punctuation, and spelling, but critics claim that AI lacks a more contextual sense of more profound, higher-order writing issues, such as idea generation or coherence (Ahmed and Fayadh, n.d.; Tran 2025). Even in certain studies, it is stated that AI grammar checkers can give incorrect feedback and put much serious thought to the prevalent mistakes of grammar recognition, which is concerning the factor of reliability. It means that AI tools can be helpful but not designed to learn languages when the students do not know why they committed errors which is probable when the corrections are given without considering which rule has been broken. A challenge is also training data bias, and overdependence by the students, are also mentioned (Ahmed and Fayadh, n.d.; Mun 2024).

Similarly, studies have also begun to compare feedback given by AI to the same given by a teacher. Even though traditional written feedback is a fundamental method of an L2 writer to train their writing capabilities, it is tedious ... (Lin and Crosthwaite, 2024) index. Certain comparative studies have revealed that AI-generated feedback can be beneficial to students better than teacher feedback leading to a reduction in anxiety and an improvement in writing performance, as was shown by undergraduates becoming better writers upon receiving the automatic facilitation as compared to self-edition (Khojasteh et al., 2025; Wang, 2024). This highlights the ability of AI to complement or outperform traditional feedback in one or more areas, particularly accuracy. Considering the progress of information technology and the implementation of AI in language teaching can be considered as a good way of transforming the learning process. Moreover, AI-approaches conserve time and resources provide new resources that improve EFL learners' academic writing (AL-Shidi, 2024).

Analysis of the Results

1. Descriptive Statistics

Measure	Grammarly Score	Teacher Score
Number of students	20	20
Total	774	839
Mean (Average)	38.7	41.95
Highest score	50	67
Lowest score	20	22

- The teacher's average score (41.95) is higher than the Grammarly average score (38.7).
- On average, the teacher awarded 3.25 points more than Grammarly.

2. Difference Analysis (Teacher – Grammarly)

Category	Number of Students
Teacher scored higher than Grammarly (+)	15 students
Same score	0 students
Grammarly scored higher than Teacher (-)	5 students

This indicates that the teacher generally evaluated students more positively than Grammarly.

3. Largest Differences

Teacher scored much higher than Grammarly:

- Student H → +17 (50 → 67)
- Student Q → +15 (50 → 65)
- Student K → +10 (48 → 57)
- Student B → +8 (27 → 35)
- Student E → +8 (40 → 48)

These cases suggest Grammarly may have been stricter or less sensitive to qualities recognized by the teacher.

Grammarly scored higher than Teacher:

- Student P → -6 (45 → 39)
- Student R → -6 (44 → 38)
- Student J → -5 (30 → 25)
- Student S → -4 (40 → 36)
- Student T → -3 (43 → 40)

These cases indicate Grammarly occasionally gave more favorable evaluations than the teacher.

4. Interpretation

The results show a moderate agreement between Grammarly and teacher assessment, but there is a tendency for:

- Teachers to assign higher scores overall
- Grammarly to be more conservative/strict

The average difference of +3.25 points suggests Grammarly may underestimate performance compared with human evaluation.

5. Suggested Research Statement

The comparison between Grammarly AI scores and teacher scores revealed that teacher assessment produced higher average scores ($M = 41.95$) than Grammarly assessment ($M = 38.7$), with an average difference of 3.25 points. Out of 20 students, 75% received higher scores from the teacher, indicating that teacher evaluation was generally more lenient and may have considered aspects of writing quality not fully captured by Grammarly's automated scoring system.

6. Calculate correlation (Pearson r), paired t-test, standard deviation, and significance level for a research paper

The study calculated the statistics for your dataset ($N = 20$ students).

Correlation Between Grammarly and Teacher Scores

Grammarly vs Teacher Scores

Relationship between Grammarly (AI) scores and teacher scores across 20 students.

1. Pearson Correlation (r)

- Pearson correlation coefficient (r) = 0.895
- Interpretation: Strong positive correlation

This means students who received higher Grammarly scores generally also received higher teacher scores. The relationship is strong and positive.

2. Paired Samples t-Test

Purpose: to determine whether the mean difference between teacher and Grammarly scores is statistically significant.

Results:

- Mean difference (Teacher – Grammarly) = 3.25
- Standard deviation of differences = 6.40
- Sample size = 20
- Degrees of freedom (df) = 19
- Standard error = 1.43
- $t(19) = 2.27$
- $p \approx 0.035$ (two-tailed)

Interpretation:

Since $p < .05$, there is a statistically significant difference between teacher scores and Grammarly scores.

Teachers, on average, gave significantly higher scores than Grammarly.

3. Standard Deviations

Variable	Mean	Standard Deviation
Grammarly Scores	38.70	10.14
Teacher Scores	41.95	12.12
Difference Scores	3.25	6.40

Interpretation:

- Teacher scores showed slightly greater variability than Grammarly scores.
- The difference SD indicates moderate inconsistency between AI and teacher evaluations.

4. Significance Level

- $\alpha = 0.05$
- Obtained $p = 0.035$
- Decision: Reject the null hypothesis

There is sufficient evidence that teacher scoring differs from Grammarly scoring.

A paired-samples t-test was conducted to compare Grammarly AI scores and teacher scores. Results showed that teacher scores ($M = 41.95$, $SD = 12.12$) were significantly higher than Grammarly scores ($M = 38.70$, $SD = 10.14$), $t(19) = 2.27$, $p = .035$. Pearson correlation analysis

revealed a strong positive relationship between Grammarly and teacher scores, $r = .895$, indicating substantial agreement between the two scoring methods despite significant mean differences.

Conclusions

The current research paper has reviewed how the AI-driven feedback can help to improve the grammatical correctness of writing among EFL students in a higher-order learning setting. The results prove that the AI-generated feedback can be influential in enhancing the grammatical performance of learners through immediate, personalized, and consistent feedback helping in the revision of writing. Students were sub-divided into two groups controlled group and experimental group, controlled groups were exposure to teacher's feedback while experimental groups were tested through (AI)feedback.

AI-based feedback also demonstrated a significant improvement in grammatical accuracy when students were exposed to such feedback, especially in the categories of rule-based errors. Nevertheless, the findings also suggest that AI-based feedback proves to be most effective in case it is combined with teacher guidance and not utilized on its own. Although AI tools are useful in solving basic grammar problems like spelling, punctuation, and sentence structure, they cannot solve the higher-order linguistic problems, use in context, and coherence that require the use of teacher feedback. This shows how AI generated feedback and human instructions are complementary to one another in EFL writing classes. Moreover, the paper indicates that AI integration can help achieve the rise of learner autonomy and decreased anxiety related to writing since students can rewrite their work on their own and get instant feedback. Although these benefits can be listed, the results also point to certain drawbacks, such as the possibility of excessive reliance on AI applications among students and the failure of automated feedback to be accurate at times. As a consequence, pedagogical planning should be performed meticulously in order to make AI-based feedback a supplementary tool of instructions, not a substitute of teacher intervention.

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