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THE IMPACT OF AI TOOLS ON ENGLISH GRAMMAR AND LANGUAGE ACCURACY OF UNIVERSITY STUDENTS

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Abstract
The use of AI-based writing assistants, grammar checkers, and language-support applications influences students' ability to identify grammatical errors, improve sentence structure, enhance vocabulary usage, and produce more accurate academic writing. This study aims to investigate the impact of AI tools on the English grammar and language accuracy of university students. A quantitative research design was employed to collect data from 300 university students through a structured questionnaire. The questionnaire focused on students' frequency of AI tool usage, perceived improvement in grammar, language accuracy, writing confidence, and possible dependence on AI-assisted feedback. The collected data were analyzed using descriptive and inferential statistical techniques to determine the relationship between AI tool usage and students' English language performance. The findings indicate that AI tools positively contribute to students' grammatical accuracy, sentence clarity, vocabulary selection, and overall writing quality. However, the study also suggests that frequent reliance on AI tools may affect students' independent grammar-checking ability and reduce their confidence in writing without technological assistance. The research recommends that universities promote responsible and guided use of AI tools to strengthen students' academic writing skills and independent language competence.

Keywords: AI tools, English grammar, language accuracy, university students, quantitative study, academic writing.

Introduction
The increasing use of artificial intelligence in higher education has changed the way university students plan, draft, edit, and evaluate academic writing. Grammar, spelling, punctuation, sentence structure, word choice, and clarity are now addressed through immediate feedback by AI-based writing assistants, including grammar checkers, automated writing evaluation systems and language-support applications. No longer just simple editing of the surface errors. Some of them apply natural language processing and machine-learning algorithms to detect patterns in writing and provide suggestions that can aid learners in improving their writing. In higher education, AI thus entered the broader trend of technology-supported learning, but as yet, researchers are not convinced of the effectiveness of these tools as aids for deep learning over mere correction (Zawacki-Richter et al. 2019).
Although many university students know English well, they continue to struggle with grammar and language in English, particularly in situations where English is a second or foreign language. Academic writing demands more than the ability to convey the basic meaning.

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Students should write grammatically, correctly use words, be cohesive and adhere to the conventions of formal academic writing. Even if students' ideas are relevant, weak grammar can diminish the clarity of an argument and impact on students' academic performance. That's why many students rely on AI tools for their writing, as they offer instant, convenient, and confidential feedback while they are working on a text. Research on online grammar checkers indicates that students believe that these online resources are helpful for enhancing their writing and their knowledge of grammar rules (Cavaleri & Dianati, 2016). This indicates that AI-guided feedback could be beneficial in improving students' language proficiency.

Based on the research on automated writing evaluation and automated corrective feedback, it is suggested that automated tools could be used to make learners aware of errors, to edit sentences, and to surface errors. When paired with suitable instructional support, automated writing evaluation feedback can be used to assist ESL students' revision process and enhance their linguistic accuracy, as found by Li et al. (2015). Likewise, Ranalli (2018) demonstrated that automated written corrective feedback may help students make corrections, but the effectiveness of WCF is related to its specificity, understandability and usability. The findings here are crucial, as they indicate that AI instruments alone are not necessarily effective at enhancing grammar. Their meaning lies in the way the student is able to interpret the feedback, to compare it with his/her existing knowledge and then use it critically for revision.

Concurrently, there are concerns of dependency and autonomous language development with the increasing use of AI writing tools. Students may make improvements to a text without developing competence if they take the suggestions without understanding why the grammar is suggested. Koltovskaia (2020) has indicated that students may be positively affected by the feedback provided by Grammarly, but that students' learning experience of feedback may vary. This implies that some learners might be using AI actively as learning devices, while others might be using it passively as correction devices. Additionally, O'Neill and Russell (2019) pointed out that University students might consider Grammarly as an assistive tool for learning, but that should not be used in place of instruction. Such issues are particularly significant in university contexts where students are asked to write on their own as well as to avoid errors.

The use of AI writing tools thus presents both opportunities and challenges for learning English. They can help boost student confidence, decrease anxiety, and provide more teacher feedback on grammar in the students' out of class environments.They can help build student confidence, lessen anxiety, and make teacher feedback on grammar easier to access out of class. Conversely, students may become too dependent and lose the ability to proofread, correct and make independent decisions about language. Godwin-Jones (2022) states that intelligent writing tools could have a positive effect on language learning, but they are pedagogically challenging to implement in the classroom due to the tools' potential impact on students' writing and revision processes and feedback interpretation. This highlights the importance of looking not only at the effectiveness of AI tools in improving writing accuracy but also at students' engagement with these tools and their view of how they are enhancing their grammar skills.

The current study aims to examine the effects of using AI instruments on the English grammar and language accuracy of university students in this context. It is based on students' frequency of using AI tools, their perceived improvement in grammar, sentence comprehensibility, word choice, writing confidence and any potential reliance on AI-driven correction. The study incorporates quantitative research design to determine if there is a meaningful relationship between the use of AI tools and students' English language performance. The study is important as AI writing tools are increasingly integrated into university writing processes, and their educational impact relies on responsible and guided usage. By gaining insight into their influence, educators, institutions, and students can leverage AI tools to enhance academic writing, build confidence in grammar skills, and view the technology as a learning aid.

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Problem Statement

AI writing tools are becoming a common practice for university students who are looking to fix grammar and improve sentence structure.AI writing tools are becoming a common practice for university students who are looking to fix grammar and improve sentence structure. These tools can enhance students' written language skills, however, over-dependence on these tools can decrease students' ability to self-edit their own writing and confidence in their written language without technological assistance. Hence, this research studied the effect of the use of AI tools on the accuracy of grammar and language in the English language for university students.

Research Objectives

1. To examine the impact of AI tools on the English grammar of university students.
2. To investigate how AI tools affect students' language accuracy in academic writing.
3. To determine the role of AI tools in improving sentence structure, vocabulary usage, and writing confidence.
4. To identify whether frequent use of AI tools creates dependence on AI-assisted feedback.
5. To analyze the relationship between AI tool usage and students' English language performance.

Research Questions

- What is the impact of AI tools on the English grammar of university students?
- How do AI tools influence students' language accuracy in academic writing?
- To what extent do AI tools improve students' sentence structure, vocabulary usage, and writing confidence?
- Does frequent use of AI tools increase students' dependence on AI-assisted feedback?
- Is there a significant relationship between AI tool usage and students' English language performance?

Literature Review

AI Writing Tools in University Language Learning

The adoption of AI tools in university writing has emerged as an essential field of study in language acquisition, as students have increasingly turned to digital systems for planning, drafting, revising, and polishing academic texts. AI writing tools include grammar checkers, automated writing evaluation systems, chatbots, machine-translation tools, and intelligent writing assistants. These tools typically give instant feedback on grammar, spelling, punctuation, vocabulary, sentence structure, style, and coherence (sometimes). AI has been investigated in the context of the broader technological support of learning in higher education, where the role of the automated system can be supportive for the students but also needs pedagogical control (Zawacki-Richter et al., 2019). Studies on AI in higher education demonstrate that it can be employed for student support, assessment and feedback, but teachers still have a role in ensuring that pupils interpret and apply the machine-generated responses (Zawacki-Richter et al., 2019).

Grammar and language accuracy is one of the most important issues in the academic success of university students, particularly university students who learn English as a second or foreign language. Students need to employ the proper sentence structure, grammar, words, and tone in academic writing. The appeal of the use of AI tools is that they provide rapid, anonymous, and regular feedback in and outside the classroom. Cavaleri and Dianati (2016) determined that students found it helpful and user-friendly, and many students felt that it was beneficial in enhancing their writing skills and learning of grammar rules. Additionally, O'Neill and Russell (2019) found that university students were positively affected by using Grammarly in conjunction with an academic learning advisor. The results indicate that AI tools are most

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effective when they are part of the writing instruction, not solely used as a correction mechanism.

This has been extended by recent advances in generative AI. Tools, like ChatGPT, can explain, rephrase sentences, substitute words, and even answer users' questions, unlike older grammar checkers. According to Barrot (2023), ChatGPT can be used as a tool for second-language writing to offer prompt feedback, writing practice, and help with form, style, and writing conventions and coherence. In a similar manner, Godwin-Jones (2022) provides the explanation that intelligent writing assistants can aid language learning when the student employs them as a language learning partner, not as a replacement for the student's own language competencies. AI tools are not just tools, but they are also becoming integrated into students' writing processes and their command of the language of the classroom.

Automated Feedback and Improvement in Grammar Accuracy

The use of the automated feedback for grammatical accuracy improvement is a prominent topic in the literature. It was not until later years that automated writing evaluation systems started to give formative feedback on language, structure, and revision, and on essay scoring. Warschauer and Ware (2006) describe how automated writing evaluation may be used to provide feedback that can be used in a classroom instructional setting to stimulate revisions and repeated writing. Warschauer and Grimes (2008) also demonstrate that AWE systems have been welcomed and yet also criticized as being able to give rapid feedback, but potentially also making the assessment process easier if applied without teacher intervention.

There are several empirical studies that indicate that the use of AI feedback can enhance students' grammar and language accuracy.There are a number of empirical studies that indicate that the use of AI feedback can enhance students' grammar and language accuracy. In a study published by Li, Link, and Hegelheimer (2015), computer-generated feedback on writing evaluation was found to be able to support ESL writers' linguistic accuracy, particularly when they are guided to revise and write. Ranalli (2018) further reported that written corrective feedback provided by a computer program can be beneficial for error correction but that specific feedback is better than generic feedback. This is significant because students aren't equally affected by all generated suggestions. Feedback should be comprehensible, precise and related to the actual writing issue.

Research on written corrective feedback also can offer a theoretical framework of how to understand AI feedback. Truscott (1996) raised doubts about the value of grammar correction in L2 writing, namely, whether it is always an effective learning tool. Ferris (1999), however, talked back in saying that not to accept grammar correction altogether was too extreme and that it might be helpful if it is selective, clear, and pedagogically meaningful. Later, Ellis (2009) divided WRAP into three categories: direct WRAP, indirect WRAP and metalinguistic WRAP. AI applications may often integrate these types of forms since they can detect a mistake in the form and propose another form to fix the issue. Thus, CFT can be considered as the branch of language teaching where AI grammar tools can be treated as its extension.

But scientists also caution about the drawbacks of automated feedback. In a review of the literature on computer-generated feedback, Stevenson and Phakiti (2014) found that the evidence for computer-generated feedback's effectiveness for improving writing quality was not overwhelming. Chapelle, Cotos and Lee (2015) also states that automated writing feedback must have validity evidence because diagnostic feedback must accurately reflect the writing construct that it is intended to measure. While these research findings indicate potential for grammar accuracy in the use of AI, they also indicate that it is not entirely accurate. When students have inadequate knowledge of grammar to critically analyze the suggestions, errors in automated feedback could lead to miscommunication.

Difficulties with Dependence, Confidence and Responsible Use

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While there are potential benefits of using AI tools to develop grammar, there are also potential risks identified in the literature. A primary issue is "students' dependence." Students interacted with Grammarly feedback in various ways, as revealed by Koltovskaia et al. (2020). Some students accepted suggestions passively while others reflected on their errors by taking advantage of the feedback. This is significant, as passive may be beneficial in one assignment, but not in fostering long-term grammar competence. Overreliance on AI tools could lead students to lose confidence in their writing abilities, especially when they are not using the technology.

Feedback research also indicates that students require an explanation as to why a correction is required. It is important to note that feedback in an L2 writing process is not simply correction, but one that is an instructional interaction that is influenced by L2 student needs, L2 teachers' guidance, and revision. (Hyland & Hyland, 2006). Link, Dursun, Karakaya and Hegelheimer (2014) also believe that the use of automated writing assessment in ESL writing classrooms demands careful planning due to the fact that teachers need to guide students in making use of the automated feedback. AI tools are meant to be a companion in the learning process, in this regard. They are expected to make students aware of their errors in grammar, make comparisons of alternatives, and acquire self-editing skills.

With the advent of generative AI, responsible use is even more crucial. While ChatGPT shows promise in L2 writing teaching, it also brings up the issues of plagiarism, authorship, and classroom management (Yan, 2023). ChatGPT can also help with L2 writing but teachers need to address a number of risks associated with overreliance, accuracy and academic integrity (Barrot 2023). Likewise, Huang, Hew, and Fryer (2022) conducted a systematic review of chatbots in language learning, revealing that while the chatbots can offer valuable language practice opportunities, their educational value is contingent upon design features, learning context, and learner engagement.

Theoretical Framework

The Technology Acceptance Model (TAM) proposed by Davis (1989) is used as the basis for this study. TAM is an explanation of how and why people accept and use technology. The theory is mainly based on two factors: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the attitude of the students to the possibility of increasing their grammar, sentence structure, vocabulary, and writing accuracy through the use of AI tools. Ease of use refers to how students perceive the AI tools as being easy, fast, and convenient to use.

This study contributes to the understanding of why university students use AI writing tools and how it impacts their English grammar and language accuracy by leveraging TAM.TAM can be applied to understand why university students use AI writing tools, and how it influences their English grammar and language accuracy. If students trust that the AI tools are beneficial and user-friendly, they will be more inclined towards frequent use. This frequent practice can enhance their grammar, accuracy in language, and confidence in writing. But when used too much, the reliance on AI feedback can become problematic.

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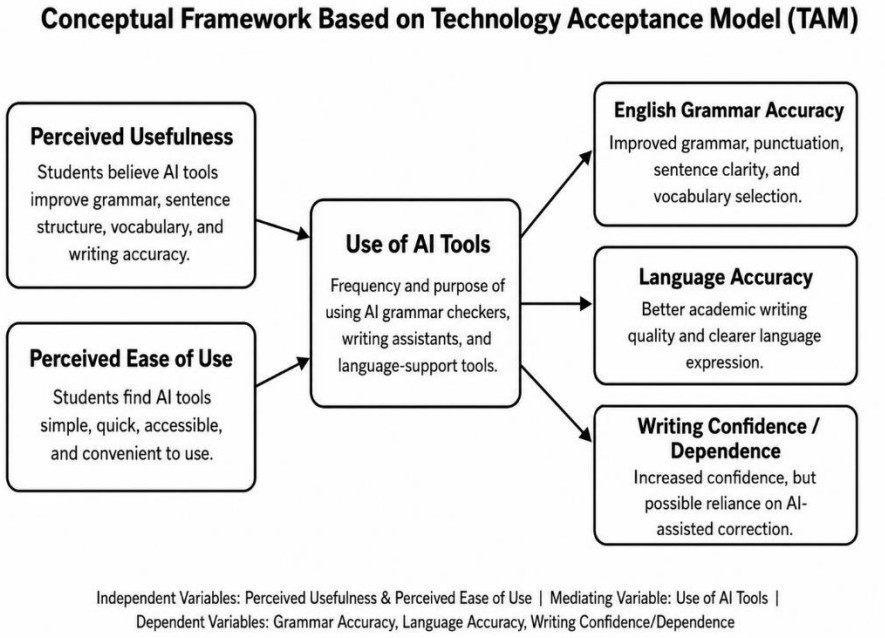

Research Methodology

This study was used a quantitative research methodology to examine the impact of AI tools on the English grammar and language accuracy of university students. Data was collected from 300 public university students through a structured questionnaire. The questionnaire was included close-ended items related to students' frequency of AI tool usage, improvement in grammar, sentence structure, vocabulary, writing confidence, and dependence on AI feedback. A Likert scale was used to measure students' responses. The reliability of the instrument was 0.84 by using Cronbach's Alpha method. The participants were selected through a convenience sampling, based on their availability and willingness to participate. The collected data was analyzed using descriptive statistics, frequency, percentage, mean, and standard deviation, and inferential statistics to examine the relationship between AI tool usage and students' English language accuracy. Ethical considerations were followed by keeping participants' responses confidential and using the data only for academic research purposes.

Results and findings

Table 1

Demographic characteristics of respondents

Variable	Category	n	%
Gender	Male	132	44.0
	Female	168	56.0
Year of study	1st year	74	24.7
	2nd year	81	27.0
	3rd year	79	26.3
	4th year	66	22.0

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Variable	Category	n	%
Frequency of AI tool use	Rarely	38	12.7
	Sometimes	92	30.7
	Often	104	34.7
	Very often	66	22.0

Table 1 shows the demographic characteristics of the 300 respondents in the study. From the gender distribution, it was observed that 132 respondents were male corresponding to 44.0%, while 168 respondents were female corresponding to 56.0%. This meant that there were a slightly higher proportion of female students in the sample. Year of study was divided into 74 1st year, 81 2nd year, 79 3rd year and 66 4th year students. The distribution indicates a fairly even representation of students from each academic year. When asked about the frequency of the use of AI tools, 12.7% of students said they used them rarely, 30.7% sometimes, 34.7% often, and 22.0% very often. This indicates that most students employed AI tools in writing quite frequently, highlighting the widespread usage of AI-powered writing tools in university settings.

Table 2

Descriptive statistics of study variables

Variable	M	SD
AI tool usage	3.84	0.71
English grammar improvement	4.02	0.66
Language accuracy	3.96	0.69
Writing confidence	3.78	0.73
Dependence on AI feedback	3.41	0.81

The descriptive statistics of main study variables are presented in Table 2. The mean score for AI tool usage was 3.84 with a standard deviation of 0.71, which indicates a high level of AI tool use among the respondents. The mean score for English grammar improvement was at 4.02, indicating that students generally felt that AI tools have helped them to improve their grammar. The mean score for language accuracy was also high at 3.96, indicating that students felt AI was helpful in enhancing writing accuracy, sentence clarity, and word selection. The mean score for writing confidence was 3.78, indicating that students felt more confident with academic writing with the use of AI. The mean score of dependence on the AI feedback was moderate with a score of 3.41, which indicates that students did not only gain from the use of AI tools but also had a degree of dependency on the AI-assisted correction.

Table 3

Pearson correlations among study variables

Variable	1	2	3	4	5
1. AI tool usage	—				

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Variable	1	2	3	4	5
2. English grammar improvement	.62**	—			
3. Language accuracy	.58**	.71**	—		
4. Writing confidence	.49**	.55**	.53**	—	
5. Dependence on AI feedback	.44**	.31**	.29**	.38**	—

Note. N = 300. p < .01.

The Pearson correlation correlation results among the study variables are shown in Table 3. The results indicate that there is a strong positive correlation between the use of the AI tool and the improvement in the English grammar (r = .62, p < .01). This implies that students who utilized the AI instruments repeatedly were more inclined to say that they improved their grammar. AI tool usage was also positively related to language accuracy, r = .58, p < .01, indicating that frequent use of AI tools was associated with better language accuracy in academic writing. Moderate positive correlation were observed between the use of AI tools and writing confidence (r = .49, p < .01). It implies that the more students relied on AI tools the more confident they were in their writing. In addition, there was a positive correlation between the use of AI tools and the students' reliance on AI feedback, r = .44, p < .01, suggesting that the more students use an AI tool to assist their learning, the more they may depend on it for feedback on their work. Overall, the findings indicate positive relationships between the use of AI tools and grammar competence, language accuracy, writing confidence, and reliance.

Table 4

Simple linear regression analysis predicting English language performance from AI tool usage

Predictor	B	SE B	β	t	p
Constant	1.21	0.18	—	6.72	< .001
AI tool usage	0.68	0.05	.61	13.54	< .001

Note. Dependent variable = English language performance. Model summary: R = .61, R^2 = .37, adjusted R^2 = .37, F(1, 298) = 183.29, p < .001.

The simple linear regression analysis is summarized in Table 4 to assess the prediction of English language performance by using AI tools. The findings indicate that using an AI tool was a strong positive predictor of English language performance, β = .61, t = 13.54, p < .001. This implies that the more students used AI tools, the higher their English language performance. The model summary indicates that R = .61 and R^2 = .37, which means the variance in students' English language performance was accounted for by 37% of the variance of the students' use of the AI tools. This is a significant percentage that indicates that using AI tools is significant in enhancing students' grammar, language accuracy and writing quality. Further, the F value is significant, F(1, 298) = 183.29, p < .001, which indicates that the regression model is statistically significant.

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Table 5

Independent samples t-test for gender differences in English language performance

Gender	n	M	SD	t	df	p
Male	132	3.81	0.64	-1.42	298	.157
Female	168	3.92	0.69			

The results of independent samples t-test for gender differences in English language performance is presented in Table 5. Result: The mean score for female students (M = 3.92, SD = 0.69) was slightly higher than that for male students (M = 3.81, SD = 0.64). The difference, however, was not significant, t(298) = -1.42, p = .157. This indicates that the gender was not significant in the students' performance in English language in the present study. The average score for girls was marginally higher but not statistically significant. Thus, the results indicated that male and female students experienced similar benefits from the use of AI tools.

Discussion

The results of this study demonstrate the positive effect of the use of the AI tools on the grammar and language accuracy of university students in their English writing. The findings showed that the students had a high frequency of use for the AI tools, implying that the use of AI grammar checkers and writing assistants has become ubiquitous in the academic context at the university level. The result is in line with the Technology Acceptance Model as it has been indicated that students tend to adopt a technology when they find it useful and easy to use (Davis, 1989). In the current study, students seemed to have used AI tools due to their belief that these tools have helped them enhance their grammar skills, sentence construction, vocabulary, and accuracy of their writings. This is in line with the previous study conducted by Cavaleri and Dianati (2016) who concluded that students believed online grammar checking helped them to write and provided them with assistance in self-directed learning.

The descriptive findings revealed very high mean values for the use of the AI tool, grammar improvement, language accuracy, and writing confidence. Overall, these results indicate that students perceived AI tools as beneficial for enhancing their academic writing. The maximum mean was observed in the area of English grammar improvement, suggesting that students were most satisfied with the use of AI tools for grammatical improvements. The findings are consistent with those of Li, Link, and Hegelheimer (2015) that automated writing evaluation feedback can help ESL writers improve linguistic accuracy, particularly when used in conjunction with revision and writing practice. Likewise, Ranalli (2018) concluded that if the forms of automated WRF are specific and understandable, then the information provided could be expected to facilitate better error correction. Thus, the results indicate that the use of the AI can improve the student's ability to detect and correct grammatical errors in writing.

The findings also indicated that there is positive relationship between using AI tools and language accuracy. Students who employed more AI tools were more likely to report higher sentence clarity, vocabulary choice, and writing quality. This is reinforced by Godwin-Jones (2022) who suggests that intelligent writing assistants can be beneficial to language learners by providing feedback on form, style, and language use. Barrot (2023) further indicates that generative AI applications like ChatGPT can help second language writing by providing timely feedback, language support, and writing practice. The findings of this study indicate that the use of AI has a positive correlation with language accuracy, implying that AI can not only aid

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in error correction but also contribute to the creation of more accurate and polished academic writing.

The results also indicated that there was a positive correlation between the use of AI tools and writing confidence. Students pointed to their increased level of confidence in writing when they used AI more often. This could be the reason why AI tools offer instant feedback and ease students' fear of grammatical errors. If students get immediate feedback and tips, they might be more confident in their writing. The result parallels that of O'Neill and Russell (2019), who found that students had a positive attitude toward the use of Grammarly in conjunction with academic writing assistance. AI tools could thus serve as supportive and confidence-building tools, particularly for students who find themselves inconsistent with the grammar or academic writing standard of English.

A moderate degree of reliance on feedback from AI was also identified, however. The result is significant as it indicates that while AI tools can assist in grammar and language accuracy, excessive use could cause students to overrely on automatic corrections. Alkhatib, et al. (2025) and Koltovskaia (2020) has revealed that students responded to Grammarly feedback in different manners: some students seemed to respond to it by reflecting on it, while others responded to it in a more passive way. This is significant for the present study, because feedback must not only be provided to a student but he must be able to understand it as a basis for improvement in the process of writing. Students may be able to enhance one text without gaining increased independent grammatical competence if they take AI's suggestions without analyzing the grammatical basis for the suggestions.

The correlation results also revealed a strong positive correlation between the use of AI tools and grammar improvement, as well as language accuracy. The positive correlations are significant, indicating that AI tools can have a meaningful role in students' English language development. Correlation does not mean causation, though, and it doesn't mean that the improvement was due to AI. Students who use AI tools more often are also more likely to strive to write better. This reinforces the statement of Zawacki-Richter et al. (2019) that AI in higher education needs to be considered in relation to a wider teaching and learning framework. While AI can be a valuable tool for education, it cannot take the place of a teacher's guidance, writing instruction, or a student's diligence.

The regression results indicated that the use of the AI tool was a significant predictor of English language performance with an explained variance in students' performance of 37%. This suggests that the use of AI tools plays an important part in students' grammar and language accuracy. But, the variance that remains implies that other factors also influence language performance including previous experience with English, writing practice, teacher input, motivation and reading. This is in line with Warschauer and Ware (2006), who proposed that automated writing evaluation should be examined in the context of its use in the classroom and not as a stand-alone approach. While AI tools can be helpful, their impact is largely dependent on how they're used in the learning process.

The t-test results revealed that there was no significant difference in the performance of the English language between the two groups of gender. The mean score for the female students was marginally higher than that of the male students, but this was not statistically significant. This indicates that AI tools might have similar impact on both genders of students. The findings suggest that AI writing tools can help students equally, provided that students are able to utilize the technology and are given the right instructions on how to do so.

Conclusion

The results indicate that AI tools have a positive impact on university students' English grammar, language accuracy, and writing confidence. The study also emphasizes the responsible use and guidance. Teachers need to remind students that AI is not a replacement

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for their writing skills, but rather a tool to help them learn, practice, and improve their writing. Students need to know how to evaluate AI feedback, learn the rules of grammar, and edit their own work. This approach allows students to learn from AI models and build their own language abilities.

Recommendations

- University students should use AI tools as learning support, not as a complete replacement for their own grammar knowledge.
- Teachers should guide students on how to understand and apply AI-generated grammar feedback correctly.
- Universities should provide training sessions on the responsible and ethical use of AI writing tools.
- Students should review AI suggestions critically before accepting corrections in academic writing.
- AI tools should be used together with teacher feedback, peer review, and regular writing practice.
- Students should be encouraged to write without AI support sometimes to develop independent grammar-checking skills.

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