IMPACT OF AI-ASSISTED SUGGESTIONS ON SYNTACTIC COMPLEXITY IN L2 ACADEMIC WRITING

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Abstract. This study examines the impact of AI-assisted suggestions on syntactic complexity in second language (L2) academic writing. With the increasing use of artificial intelligence tools in language education, AI-based writing assistants are becoming an integral part of students' writing processes. This research focuses on how AI-generated syntactic suggestions influence sentence structure, clause combination, and overall syntactic sophistication in L2 student essays The study adopts a quasi-experimental design involving university-level L2 learners divided into an experimental group and a control group. The experimental group received AI-assisted suggestions related to sentence restructuring, clause expansion, and grammatical refinement, while the control group received traditional teacher feedback. Syntactic complexity was measured using indicators such as mean length of sentence, subordination ratio, and clausal density. A mixed-methods approach was employed, combining quantitative analysis of students' written texts with qualitative analysis of revision strategies.

The findings reveal that students who received AI-assisted suggestions demonstrated a significant increase in syntactic complexity compared to those who relied solely on teacher feedback. AI support encouraged the use of more complex sentence structures, greater subordination, and more varied syntactic patterns. However, the results also indicate that AI-assisted suggestions are most effective when integrated with teacher guidance. The study concludes that AI tools can play a positive role in developing syntactic complexity in L2 academic writing when used as a supportive instructional resource.

Introduction

Syntactic complexity is widely recognized as a crucial indicator of writing proficiency in second language academic writing. The ability to construct complex sentences, effectively use subordination, and vary syntactic patterns reflects learners' advanced language development and academic competence. However, L2 learners

often rely on simple sentence structures, which may limit the clarity and sophistication of their written texts.

Traditionally, the development of syntactic complexity has depended on teacher feedback, grammar instruction, and extensive writing practice. While teacher feedback is valuable, it is often constrained by time limitations and may not provide detailed, individualized guidance on syntactic restructuring. As a result, students may struggle to independently improve sentence-level complexity in their writing.

The emergence of artificial intelligence in language education has introduced new possibilities for supporting syntactic development. AI-assisted writing tools are capable of identifying grammatical weaknesses, suggesting sentence restructuring, and recommending the use of more complex syntactic forms. These features allow learners to receive immediate feedback and experiment with more advanced sentence constructions during the writing process.

This study investigates the impact of AI-assisted suggestions on syntactic complexity in L2 academic writing. By comparing student essays before and after exposure to AI-generated syntactic feedback, the research seeks to determine whether such tools can meaningfully enhance learners' sentence-level proficiency. The study argues that when used alongside traditional instruction, AI-assisted suggestions can foster greater syntactic awareness and contribute to improved academic writing quality.

Literature Review

Previous research in second language (L2) writing has consistently emphasized syntactic complexity as a key dimension of writing quality and language development (Larsen-Freeman, 2006). Studies indicate that limited syntactic variety often results in overly simple texts that fail to meet academic writing standards. Teacher feedback has traditionally played a central role in guiding learners toward more complex sentence structures, yet its effectiveness may be limited by workload and delayed feedback (Hyland, 2003).

With advances in educational technology, AI-assisted feedback systems have gained increasing attention in L2 writing research. Several studies suggest that AI-based tools can identify grammatical simplicity, recommend sentence expansion, and encourage the use of subordination and coordination (Lu, 2011; Ranalli, 2021). Such tools provide immediate, individualized feedback, which may enhance learner engagement and promote iterative revision.

Despite these advantages, scholars also highlight limitations of AI-assisted feedback. Automated systems may focus primarily on structural complexity without fully considering discourse-level coherence or rhetorical appropriateness (Ware, 2018). There is also a risk that learners may accept AI suggestions mechanically, without fully understanding underlying syntactic principles. Furthermore, while many studies examine general writing improvement, fewer focus specifically on syntactic complexity as an independent outcome.

From a theoretical standpoint, syntactic development aligns with usage-based theories and the noticing hypothesis (Schmidt, 1990), which emphasize the role of awareness and repeated exposure in language acquisition. AI-assisted suggestions may enhance noticing by drawing learners' attention to alternative syntactic forms and encouraging deeper cognitive processing. Nevertheless, empirical evidence on the long-term impact of AI tools on syntactic complexity in L2 academic writing remains limited.

Overall, existing literature highlights the potential of AI-assisted feedback while also pointing to unresolved challenges. There is a clear research gap concerning the comparative effects of AI-assisted suggestions and traditional teacher feedback on syntactic complexity. This study seeks to address this gap by providing empirical evidence from a university-level L2 writing context.

Research Objectives

 To examine the effects of AI-assisted suggestions on syntactic complexity in L2 academic writing.
 To compare the impact of AI-assisted suggestions and traditional teacher feedback on sentence structure and syntactic variation in L2 student essays.

Research Questions

 How do AI-assisted suggestions influence syntactic complexity in L2 academic writing?
 In what ways do AI-assisted suggestions differ from traditional teacher feedback in promoting complex sentence structures in L2 writing?

Methodology

This study adopts a mixed-methods research design to investigate the effects of AI-assisted suggestions on syntactic complexity in L2 academic writing. The research is grounded in a pedagogical and usage-based perspective of second language writing, which views syntactic development as a gradual process supported by noticing, revision, and repeated exposure to complex structures. In traditional writing instruction, syntactic development often relies on teacher feedback, which may be constrained by time limitations and tends to prioritize grammatical accuracy and content organization rather than sentence-level complexity.

In this study, syntactic complexity is conceptualized as an indicator of underlying language development rather than surface-level correctness. Improvement is assessed through increased use of complex sentence structures, greater subordination, longer and more elaborated sentences, and more varied syntactic patterns, rather than through error reduction alone. This approach allows for a deeper examination of how feedback supports learners' syntactic awareness and their ability to manipulate sentence structures during revision.

A central concept guiding the methodology is feedback mediation. AI-assisted suggestions are treated not merely as corrective input, but as a form of guided noticing that draws students' attention to syntactic simplicity, sentence fragmentation, and limited clause use. Rather than positioning AI feedback as a replacement for teacher input, the study explores how learners interact with automated syntactic suggestions

and how these interactions influence their revision strategies and sentence construction choices.

The participants of the study were undergraduate L2 learners enrolled in an academic writing course. They were divided into two groups: an experimental group that received AI-assisted syntactic suggestions on their essay drafts and a control group that received traditional teacher feedback. Both groups completed identical writing tasks under comparable instructional conditions. The data consisted of first and revised drafts of student essays collected over an eight-week instructional period.

Syntactic complexity was analyzed using quantitative measures such as mean length of sentence, ratio of subordinate clauses, and clausal density. In addition, qualitative analysis was conducted to examine how students revised sentence structures in response to feedback. By applying the same analytical framework to both groups, the study enables a meaningful comparison between the effects of AI-assisted suggestions and teacher-provided feedback on syntactic development in L2 academic writing.

Analysis Part I: Students Receiving AI-Assisted Suggestions

At the initial stage of the study, students in the experimental group demonstrated relatively low levels of syntactic complexity in their essays. Their writing was characterized by short, simple sentences, limited use of subordination, and frequent reliance on coordinate structures. These patterns suggested restricted syntactic variation rather than an absence of grammatical knowledge.

Following exposure to AI-assisted suggestions, students were frequently prompted to revise sentence structure. Automated feedback highlighted overly short sentences, suggested combining related clauses, and recommended the use of subordinate constructions. In the early stages, many revisions were surface-level. Students often merged sentences mechanically without fully adjusting cohesion or meaning. Nonetheless, this phase marked an important shift, as students began to notice limitations in their syntactic patterns.

As the revision process continued, students' engagement with syntactic feedback became more intentional. Instead of merely accepting automated suggestions, they began experimenting with clause embedding and sentence expansion. For example, simple sentences were transformed into complex sentences through the use of relative clauses and adverbial subordinators. These revisions reflected increased syntactic awareness rather than passive correction.

Over time, students demonstrated greater confidence in manipulating sentence structures. They began to vary sentence length, integrate multiple ideas within a single sentence, and reduce excessive reliance on simple clause sequences. Importantly, these changes emerged gradually, indicating internalized development rather than temporary modification. The improvement was not driven by memorization of grammatical rules, but by increased sensitivity to syntactic patterns in their own writing.

By the end of the intervention, the experimental group showed a noticeable increase in syntactic complexity. Their revised essays contained longer sentences, higher levels of subordination, and more varied syntactic constructions. These findings support the view that AI-assisted suggestions can foster syntactic development through sustained noticing and iterative revision, guiding learners toward more advanced sentence-level control.

Analysis Part II: Students Receiving Teacher Feedback

In contrast, students in the control group primarily received teacher feedback focused on content development, coherence, and grammatical accuracy. While teachers occasionally addressed sentence structure, explicit attention to syntactic complexity was less systematic. As a result, early drafts exhibited similar patterns of syntactic simplicity to those observed in the experimental group.

Revisions made by students in the control group tended to emphasize error correction rather than sentence expansion. Many students corrected tense usage, agreement errors, or punctuation issues, but retained simple sentence patterns. This suggests that without targeted prompts encouraging syntactic elaboration, students may not prioritize complexity in their revisions.

However, teacher feedback provided deeper contextual and rhetorical guidance. When sentence-level comments were offered, students demonstrated strong understanding of meaning and appropriateness. These revisions were fewer in number but often more coherent and stylistically appropriate. This highlights the strength of human feedback in addressing discourse-level nuance and contextual appropriacy.

Overall, syntactic development in the control group was slower and less consistent. Improvements in complexity occurred primarily when students independently restructured sentences or when teachers explicitly addressed syntactic issues. In contrast to the experimental group, opportunities for repeated syntactic noticing were limited.

Taken together, the findings from both groups suggest that AI-assisted suggestions are particularly effective in raising awareness of syntactic simplicity and encouraging repeated sentence-level revision. When combined with teacher guidance, AI support has the potential to promote deeper and more balanced syntactic development in L2 academic writing.

Comparative Discussion

Although students receiving AI-assisted suggestions and those receiving teacher feedback completed identical academic writing tasks, their syntactic development followed noticeably different trajectories. Both groups operated within the same institutional conditions, including curriculum objectives, time constraints, and assessment criteria. However, the nature of the feedback they received significantly influenced how they approached sentence construction, revision strategies, and awareness of syntactic form. Importantly, syntactic development in both groups occurred gradually through repeated engagement with feedback rather than through immediate transformation.

For students in the AI-assisted group, expectations were primarily shaped by automated prompts focusing on sentence structure. These students were encouraged to identify syntactically simple constructions, combine clauses, and revise sentence patterns independently. AI-assisted suggestions consistently highlighted issues such as short sentences, limited subordination, and lack of syntactic variation. This constant exposure created an environment in which syntactic awareness became unavoidable. In contrast, students in the teacher-feedback group experienced expectations shaped by human evaluation, where feedback emphasized coherence, argumentation, and grammatical accuracy, and syntactic complexity received less systematic attention.

The ways in which each group responded to these expectations reveal key differences in their developmental paths. Students receiving AI-assisted suggestions initially relied heavily on mechanical sentence combination, sometimes increasing sentence length without improving coherence. Over time, however, they began to evaluate suggestions more critically, adapting syntactic structures to fit meaning and context. This shift reflects a gradual move toward syntactic self-regulation, even though learners remained supported by automated feedback. Students receiving teacher feedback, by contrast, demonstrated deeper understanding when syntactic issues were explicitly addressed, but revisions were less frequent and less consistent. Their syntactic development was more selective and largely dependent on direct teacher intervention.

Despite these differences, both groups achieved comparable levels of academic writing awareness by the end of the study. Students in the AI-assisted group developed heightened sensitivity to sentence-level complexity and structural variety, while students in the teacher-feedback group prioritized clarity, correctness, and overall coherence. In both cases, syntactic improvement emerged through internalized learning processes rather than dramatic stylistic shifts. Increased use of complex sentences, greater control over clause relationships, and improved sentence integration developed progressively over time.

To clarify the similarities and differences in syntactic development, Table 1 summarizes the key stages observed in both groups.

Table 1. Comparative Stages of Syntactic Development

Stage of Development	AI-Assisted Suggestions Group	Teacher Feedback Group
Initial expectations	Expected to revise sentence structure independently using automated syntactic prompts.	Expected to revise based on teacher comments focusing on content and accuracy.
Primary challenge	Mechanical sentence combination and surface-level complexity.	Limited attention to syntactic complexity due to broader feedback focus.

Response to difficulty	Gradual shift toward conscious manipulation of clause relationships.	Selective syntactic improvement when explicitly guided by teacher feedback.
Turning point	Ability to evaluate and adapt AI suggestions contextually.	Recognition of syntactic issues when linked to clarity and coherence.
Form of maturity	Syntactic self-regulation and increased structural awareness.	Balanced control of accuracy with emerging syntactic variation.
Type of development	Feedback-driven, iterative syntactic growth supported by automation.	Instructor-guided, selective syntactic development.

As the comparison demonstrates, although the sources of feedback differ, both groups achieved syntactic improvement through sustained engagement rather than immediate correction. Syntactic complexity develops not simply as a result of instruction, but through repeated noticing, revision, and growing awareness of sentence-level choices.

Taken together, these findings challenge the assumption that only human feedback can support meaningful syntactic development. AI-assisted suggestions do not replace teacher input; rather, they reshape the revision process by maintaining continuous attention to sentence structure. Expectations—whether automated or human—do not constrain development, but guide it along different developmental paths.

Conclusion

This study investigated the impact of AI-assisted suggestions on syntactic complexity in L2 academic writing by comparing them with traditional teacher feedback. Although both feedback types functioned within the same instructional context, the findings indicate that they influenced syntactic development in distinct ways. In both groups, syntactic growth was gradual and internal, emerging through repeated revision and increased awareness rather than immediate improvement.

AI-assisted suggestions supported syntactic development by consistently drawing students' attention to sentence structure, clause relationships, and opportunities for syntactic elaboration. Over time, students learned to construct more complex sentences and gained greater control over syntactic variation. Teacher feedback, meanwhile, provided deeper contextual and rhetorical guidance, supporting accuracy and coherence, though syntactic complexity was addressed less systematically.

The findings suggest that syntactic development does not require radical changes in instructional practice. Instead, growth can occur through sustained exposure to feedback and reflective revision processes. When integrated thoughtfully, AI-assisted suggestions can complement teacher instruction by reinforcing syntactic awareness and encouraging learner autonomy.

By illustrating alternative paths of syntactic development, this study contributes to ongoing discussions about the role of artificial intelligence in language education. It demonstrates that AI-assisted feedback, rather than limiting learning, can support meaningful and lasting improvement in syntactic complexity when combined with human guidance.

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