Pedagogical use of scientific abstracts to strengthen the use of discourse connectors and academic structures in the writing of university EFL students

Uso pedagógico de resúmenes científicos para fortalecer el uso de conectores de discurso y estructuras académicas en la escritura de estudiantes universitarios de EFL

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ABSTRACT

This study examines the pedagogical impact of using scientific research abstracts on the development of academic writing skills among university EFL students, with particular

attention to academic structures and discourse connectors. A quasi-experimental mixed-methods design was implemented with 200 upper-intermediate university students. The participants were divided into control and experimental groups. The control group received no intervention, while the experimental group received the intervention using scientific abstracts. The results of the quantitative analysis indicated that instruction focused on reading has a strong impact on writing production; however, the positive effects are more pronounced when using scientific abstracts. Additionally, writing components such as rhetorical organization, use of academic structures, and the presence of discourse connectors were observed only in the experimental group. Hence, the results of this study demonstrated that scientific abstracts can be considered rich resources for promoting reading and writing, serving as an effective bridge between them. Also, the benefits of this abstract lie in its concise and authentic modeling of academic discourse. Therefore, abstract-based instruction facilitates learners' internalization of rhetorical moves, the use of disciplinary language features, and cohesive devices central to academic writing.

Keywords: *Academic Writing, Discourse Connectors, Reading–Writing Integration, Scientific Abstracts.*

RESUMEN

Este estudio examina el impacto pedagógico del uso de resúmenes de investigaciones científicas en el desarrollo de las habilidades de escritura académica de estudiantes universitarios de inglés como lengua extranjera (EFL), con especial atención a las estructuras académicas y los conectores discursivos. Esta investigación siguió un diseño cuasiexperimental de métodos mixtos, los participantes fueron 200 estudiantes universitarios de nivel intermedio-alto, divididos en grupos de control y experimental. El grupo de control no recibió ninguna intervención, por lo que la instrucción lectora se realizó mediante lecturas en inglés general, mientras que el grupo experimental utilizó lecturas de resúmenes científicos disciplinares. Los resultados del análisis cuantitativo indican que toda instrucción centrada en la lectura tiene un alto impacto en la producción escrita; sin embargo, los efectos positivos tienden a ser más significativos cuando se utilizan resúmenes científicos. Además, los componentes de la escritura, como la

organización retórica, el uso de estructuras académicas y la presencia de conectores discursivos, fueron significativamente positivos en el grupo experimental. Por lo tanto, los resultados de este estudio demostraron que los resúmenes científicos pueden considerarse recursos valiosos para promover la lectura y la escritura, sirviendo como un puente eficaz entre ambas. Asimismo, los beneficios del resumen científico radican en su modelado conciso y auténtico del discurso académico. Por lo tanto, la instrucción basada en resúmenes facilita en los estudiantes la internalización de los movimientos retóricos, del uso de las características disciplinarias del lenguaje y de los dispositivos de cohesión centrales para la escritura académica.

Palabras clave: *Conectores Discursivos, Escritura Académica, Integración Lectura–Escritura, Resúmenes Científicos.*

INTRODUCTION

It is well known that reading has an important effect on writing skills, especially in academic contexts. The effect of reading on writing skills is highly relevant to university students, especially when creating texts that follow the written conventions of their major. According to Graham and Hebert (2011), reading activities contribute to the development of writing production mainly by enhancing learners' control over language resources and discourse organization. Also, Peng et al. (2018) demonstrated that reading experiences can strengthen writing performance by providing models of text organization, vocabulary, and syntactic structures.

Also, some research in this area suggests that an intervention that integrates reading and writing can produce measurable benefits in writing quality, especially when tasks require students to use texts strategically (Graham et al., 2018). In this regard, Grabe & Zhang (2013) argued that integrated reading–writing tasks are necessary and valuable because they reflect the authentic demands of academic study.

The benefits of reading activities with scientific abstracts lie in the repeated exposure to content, patterns, and devices. Hence, this continuous exposure supports students' acquisition of discourse connectors, patterns, and conventional phraseology (Grabe & Zhang, 2013). Additionally, instruction focused on reading abstracts allows learners to notice how expert writers select evidence, paraphrase, and manage citations and synthesis, skills central to university writing (Wette, 2010).

Increased Interest and Engagement When Reading Aligns With Students' Majors

Regarding motivation and engagement, they serve as mediators in reading development, particularly for university EFL learners who often perceive reading in English as difficult, time-consuming, or less relevant to their professional goals. Hence, when texts are aligned with students' academic majors, reading can move from a general language exercise to a purposeful disciplinary activity. And, this relevance tends to increase their interest in reading, attention, and perceived value, which, ending promoting deeper processing and learning.

Evidence from reading approaches suggests that focused reading within a specific discipline or topic area can improve not only comprehension and vocabulary as well as students' perceptions of usefulness and interest. For instance, Bunparit and Riabroi (2025) found that undergraduate students in forestry and agriculture perceived discipline-focused reading as meaningful for their studies and future careers, which ended up promoting reading comprehension and lexical knowledge. Moreover, Yuan et al. (2023) highlighted

that purposeful reading materials and learning activities can shape learners' motivational engagement, particularly when connected to real academic needs and contexts.

When referring to motivation, disciplinary connection offers an important linguistic advantage. First, it increases repeated exposure to the academic structures and lexical features typical of the field. Second, continuous exposure can be especially helpful for improving the use of academic connectors, because students see how the same logical relations, such as contrast, cause–and–effect, addition, exemplification, and concession, are highlighted within their discipline's discourse practices (Lei, 2012).

Using Research Article Abstracts to Promote Reading Skills and Academic Writing

Scientific abstracts are increasingly viewed as powerful pedagogical resources in English-learning classrooms because they are short, information-dense, and highly patterned. One of the benefits of using abstracts rests in how they model conventional academic rhetorical patterns. Morton (1999) argues that abstracts can function as authentic academic material that supports both reading practice and writing development. In addition, abstracts reduce cognitive stress compared with full-length research articles, mainly because learners can focus on the architecture of academic meaning as the purpose, method, results, and implications without becoming overloaded by long arguments or extensive literature reviews.

In the same hand, abstracts are particularly designed to promote skills such as identifying the main purpose, scanning for methods and results, recognizing discipline-specific terminology, and inferring relationships between research components. It is

possible, since abstracts typically condense complex information into a concise form, making cohesive ties and discourse connectors visible (Archila, et al. , 2022). In the same hand, abstract reading can support academic production through modeling. Extensive reading research also suggests

that regular exposure to texts can influence writing performance, particularly when reading is paired with writing practice that reuses or transforms learned patterns (Linuwih, 2021). Therefore, scientific abstracts, only when selected strategically and paired with guided tasks, can function as high-impact input for EFL students' academic writing.

Abstracts as a Genre for Developing Academic Structures

In linguistics, abstracts are considered an academic genre that compresses a set of predictable linguistic features. In genre-analytic analyses, researchers have demonstrated that abstracts commonly include communicative functions such as situating the topic, stating the purpose, outlining methods, and presenting results (Pho, 2008). Moreover, Can (2016) insisted that these linguistic characteristics are not random; rather, they respond to the requirements and expectations of academic discourse communities.

In this regard, Pho (2008) indicated that academic paragraphs share similar rhetorical organization and linguistic features, mainly due to disciplinary expectations that model what written texts are expected of members of a disciplinary community. Moreover, Can (2016) studied move patterns in abstracts, which led to the development of instructional materials. Hence, an instructional approach in which abstracts serve as genre models to

teach students how academic texts are built is not an isolated aspect of learning a second language; it presents an opportunity to potentiate learners' academic writing.

Additionally, corpus-based studies reveal that abstracts frequently include specific academic structures central to university writing, such as stance constructions like "we argue that…," "the results indicate that…" and discipline-appropriate phraseology (Hyland & Tse, 2005). These patterns are often difficult for EFL students to acquire through isolated grammar instruction because they are tightly connected to rhetorical purpose. Abstract-based pedagogy can therefore integrate form and function: students learn *why* structures occur for communicative purposes and *how* they are realized linguistically through grammar and lexis.

Abstracts and the Development of Discourse Connectors in Academic Writing

The role of discourse connectors in written text is crucial because they ensure cohesion and coherence among texts by making logical relations explicit and guiding readers through the argument's flow. However, research on EFL academic writing shows that learners tend to overuse a limited set of connectors, or underuse certain categories, particularly adversative and concessive ones (Lei, 2012). Considering that, using abstracts as a material resource to learn how to use connectors can lead to the positive acquisition of these discursive devices.

Commonly, abstracts include multiple rhetorical functions such as problem–purpose, method–result, and result–implication. Hence, when students read discipline-related abstracts, they observe how expert writers in the field use connectors logically. As Pho

(2008) claimed, using abstracts allows learners to identify connector categories, examine positional patterns, and compare connector choices across disciplines.

Synthesis and Research Gap

The literature provides a strong rationale for integrating reading and writing through authentic academic materials, particularly when these materials align with students' disciplinary interests. Reading contributes to writing development (Graham & Hebert, 2011; Graham et al., 2018), and disciplinary relevance increases engagement and perceived usefulness (Bunparit & Riabroi, 2025; Yuan et al., 2023). In this regard, abstracts are perceived as an efficient genre for teaching rhetorical organization and academic structures across disciplines (Can, 2016; Pho, 2008; Hyland & Tse, 2005).

However, it is necessary to conduct more classroom-based research that combines the application of disciplinary abstract reading with highlighting aspects such as explicit connectors and academic-structure instruction to assess improvements in academic writing cohesion among university students. The present study addresses this gap by positioning scientific abstracts as both disciplinary input and genre templates, using technological tools to scaffold noticing, practice, and revision focused on discourse connectors and academic structures.

Research questions

This study has the following research questions.

1. To what extent does the pedagogical use of scientific research abstracts influence the development of academic writing skills in university EFL students?
2. Which components of academic writing, like rhetorical organization, grammatical accuracy, academic structures, and cohesion, show the greatest improvement after the instructional use of scientific abstracts?
3. To what extent does the use of scientific abstracts improve university EFL learners' use of discourse connectors in academic writing?
4. Which categories of discourse connectors (additive, adversative, causal, and temporal) are most affected by abstract-based instruction?

METHODOLOGY

Research Design

This study was carried out using a quasi-experimental, mixed-methods research design, as this design is appropriate for teaching contexts where random assignment is not feasible (Creswell et al, 2018). The design compares academic writing development between groups exposed to an instruction based on scientific research abstracts and groups instructed using general reading materials.

The quantitative component responds to the research questions regarding measurable improvement in academic writing skills and in the use of discourse connectors. On the other hand, the qualitative component requires an analytic interpretation of participants' writing samples (Dörnyei, 2007). Hence, this analysis intends to gain a better understanding of how abstract-based instruction influenced learners' academic writing performance.

Despite the mixed-methods design, this study considers the pedagogical use of scientific research abstracts as reading materials, while the dependent variables were academic writing skills (rhetorical organization, grammatical accuracy, academic structures, and cohesion) and the use of discourse connectors (additive, adversative, causal, and temporal).

Participants and Context

The participants were 200 university EFL students enrolled in the fifth level of the Language Center at a public university. Their ages ranged from 20 to 25 years, and all the participants had reached an upper-intermediate level (approximately B1–B2 according to the CEFR), which is considered appropriate for engaging with academic texts such as scientific abstracts (Hyland, 2019).

The participants were distributed into four groups of 50 students each:

Control Groups: Groups J and K (n = 100)

- These groups followed the regular curriculum and used general reading materials (textbook-based academic passages and non-specialized texts).

Experimental Groups: Groups L and U (n = 100)

- These groups received instruction using only scientific research abstracts as reading materials during the course's reading component.

All groups followed the same syllabus objectives, writing tasks, assessment criteria, and instructional time. The only systematic difference between groups was the type of reading input used during instruction. This approach corresponds with quasi-experimental standards for instructional research in EFL contexts (Shadish et al., 2002).

Instructional Treatment

Abstract-Based Instruction (Experimental Groups)

Students in the experimental groups were exposed exclusively to scientific research abstracts selected from peer-reviewed journals related to students' academic majors. The abstracts were chosen based on the clearness in their rhetorical structure (purpose, method, results, implications) and the appropriateness of linguistic complexity for B1–B2 learners, the appearance of explicit use of discourse connectors, and academic structures, and the relevance to students' disciplinary interests.

The instructional steps followed three stages:

- Pre-reading: Activation of background knowledge and identification of abstract structure
- While reading: Guided analysis of rhetorical moves, academic structures, and discourse connectors
- Post-reading: Writing tasks requiring students to produce short academic texts or mini-abstracts.

During the intervention, the students were asked to notice how connectors signaled logical relations and how grammatical structures functioned in academic discourse (Schmidt, 1990). Regarding the control group, they followed the same instructional sequence and writing tasks but used general academic reading materials from the course textbook. The study was conducted for 2 months (8 weeks). During this time:

- A pre-test writing task was administered at the beginning of the study.
- The instructional intervention was implemented during regular reading sessions.

- A post-test writing task was administered at the end of the intervention.

Instruments

Academic Writing Test

An academic writing test was administered as both a pre-test and a post-test. Students were required to write a short academic text in 250 to 300 words aligned with their field of study. The tasks were structurally and difficulty-wise equivalent to ensure test equivalence. The writing tasks were assessed using an analytic approach. Also, the rubric evaluates rhetorical organization, grammatical accuracy, and the use of academic structures, as well as cohesion and coherence (Hyland, 2019; Weigle, 2002).

Moreover, each component was scored on a 5-point scale. Inter-rater reliability was ensured through rater training and double scoring of 20% of the scripts, yielding an acceptable reliability coefficient (Cohen's $\kappa > .80$).

Discourse Connector Analysis Framework

Additionally, students' writing samples were analyzed for frequency, accuracy, and variety of discourse connectors. Connectors were classified into four categories following Halliday and Hasan's (1976) functional taxonomy: Additive, Adversative, Causal, and Temporal. Finally, both pre-test and post-test texts were coded manually and cross-checked using corpus-assisted analysis, a method commonly employed in academic writing research (Lei, 2012).

Data Analysis

Descriptive statistics were used to summarize writing performance and to assess whether significant differences existed among group means. The T-test was conducted to compare pre-test and post-test results within groups. Also, the independent-samples t-tests were used to compare the experimental and control groups. In addition to the quantitative analysis, a qualitative examination of random representative writing samples was conducted. This qualitative analysis focused on analyzing the amount, use, and correctness of connectors and rhetorical coherence in the written texts. Regarding ethical issues, participation was voluntary, and participants' confidentiality was protected.

RESULTS

Influence of pedagogical use of scientific research abstracts on the development of academic writing skills

Based on the pre-test and post-test writing tests, the results demonstrated that intensive reading sessions have a positive effect on writing in general. The t-test was applied to the results of the pre-test and post-test, focused on writing in both groups, the control and the intervention demonstrated that the intensive reading practice exercise a positive effect on both groups, this could be observed in the results of the p value, in the case of the control group it was p=0,005, while in the intervention group it was p=0,000.

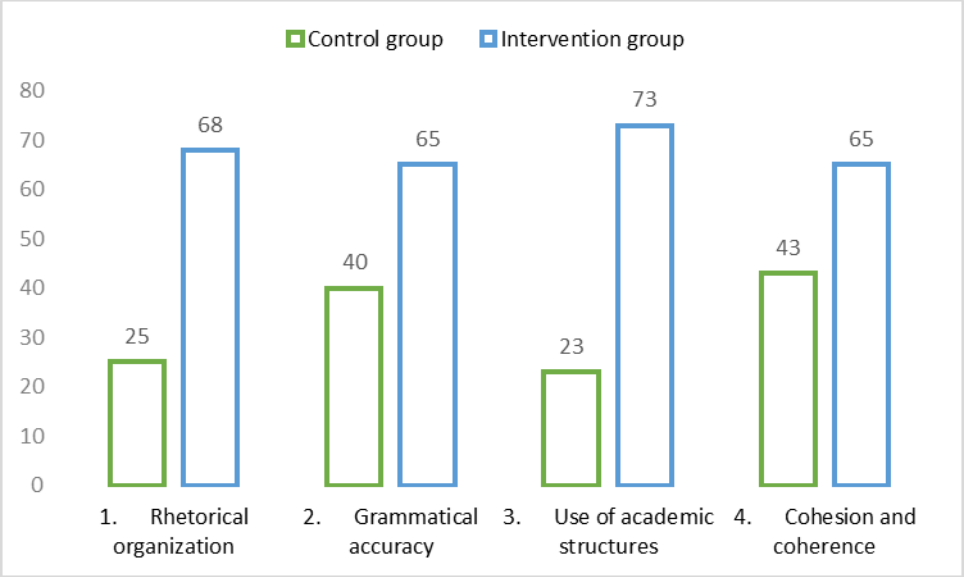
However, after applying the Pearson correlation, the control group showed a correlation of 0.65, indicating a moderate correlation. On the other hand, when the same analysis was applied, the intervention group demonstrated a higher correlation of 0,89,

indicating a strong relationship between the use of scientific research abstracts and the development of academic writing.

Academic writing components

The analysis of writing production in the post-test for both groups showed that the intervention group used them more, while the control group used them less.

Figure 1. Academic writing components in writing production

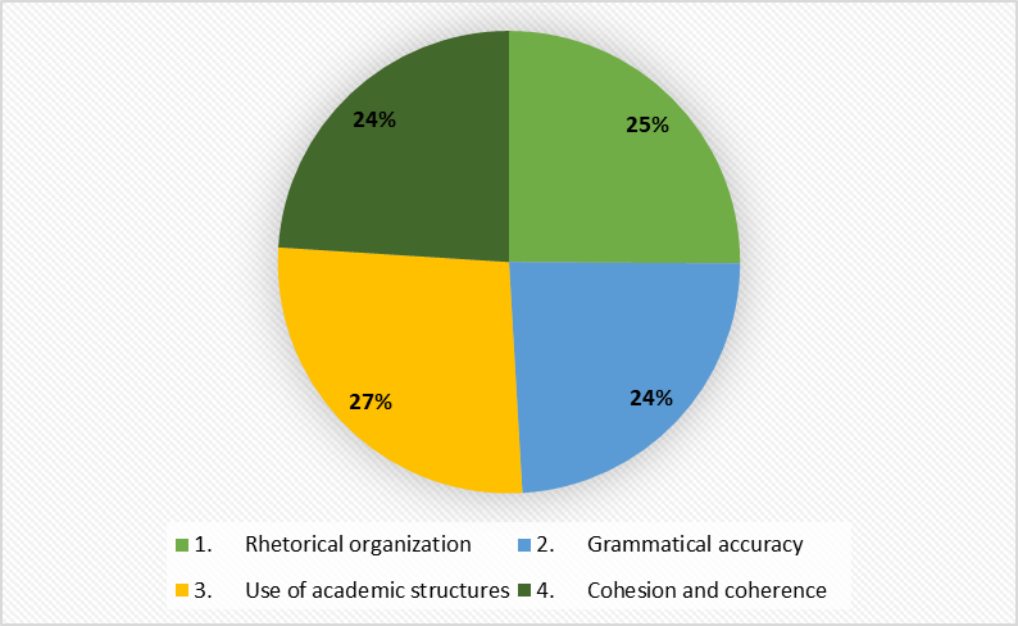


Note. Comparison between the results of the intervention and control groups.

Figure 1 shows that learners who focused on scientific research abstracts outperformed the control group in the frequency of academic writing. This wide difference is mainly evident in specific aspects of academic writing, such as rhetorical organization and the use of academic structures. However, this difference is important but less extreme in aspects related to grammatical accuracy, cohesion, and coherence than in the control group.

Regarding the intervention group's results on academic writing components, the four identified components appear equally affected by the use of academic abstracts, and academic structures and rhetorical organization occur most frequently in their written production (Figure 2).

Figure 2. Proportion of academic components in the writing production of the intervention group

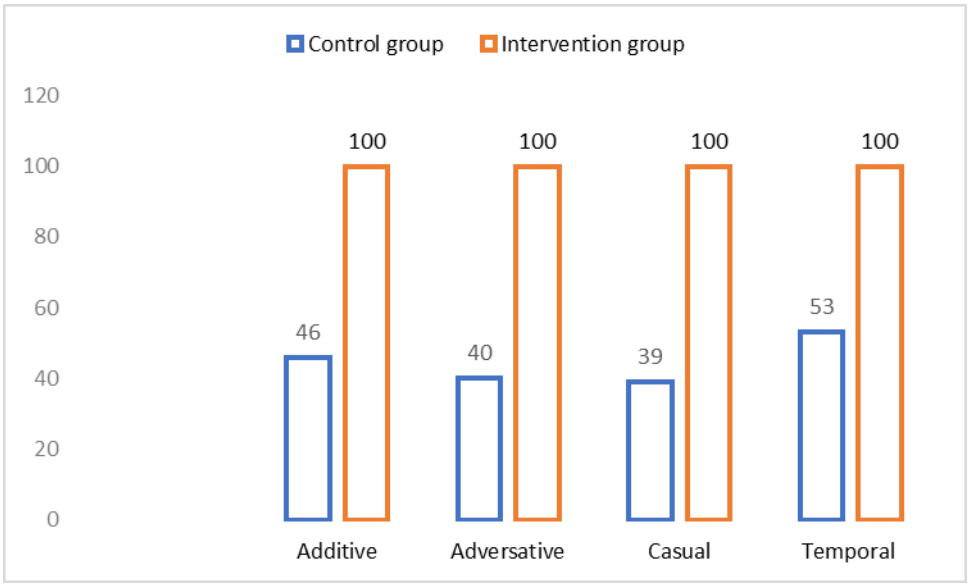


Note. Results of the intervention on written production.

Use of discourse connectors in academic writing

A comparison of the number of discourse connectors used in the writing production in the exit test shows that they are nearly absent in the control group. On the other hand, the participants who were exposed to the intervention demonstrated a higher demand for this academic connector in their writing production in the post-test (see Figure 3).

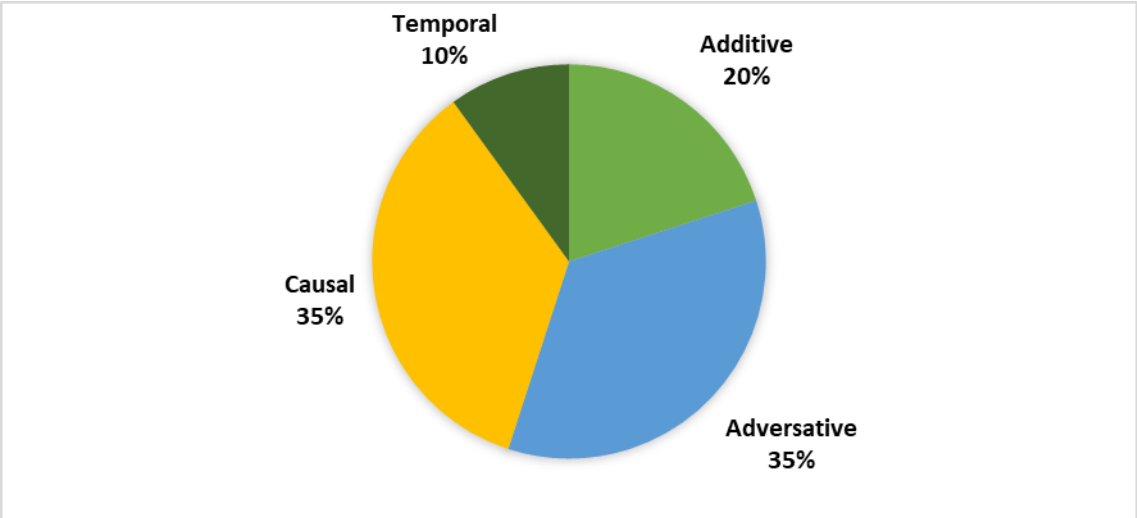
Figure 3. Appearance frequency of discourse connectors in the writing production of the intervention and control groups



Note. Comparison between the results of the intervention and control groups

Since the intervention group had a high frequency of discourse connectors, the adversative, causal, temporal, and additive were the most frequent. Among these groups, the adversative and causal ones had equal impact, with 35% of appearance in the writing production in the post-test, while the additive connectors represented 20% of usage, and the temporal only 10%.

Figure 4. Proportion of types of discourse connectors in the writing production of the intervention group production

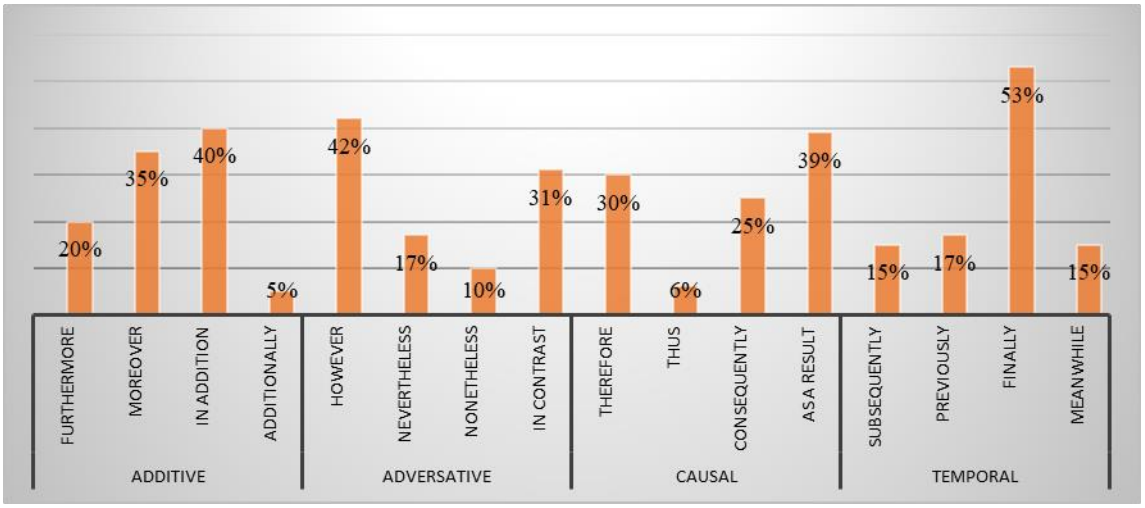


Note. Results of the intervention written production.

In relation to the type of discourse connectors used in the writing production of the intervention group, some devices were identified among the categories. Regarding the additive, the most remarkable connectors were *in addition*, and *moreover*, while the *additionally* and *furthermore* were the less use in this category. Regarding the adversative discourse, *nowhere* and *in contrast* were the most required for the students in their writing, while *nonetheless* and *nevertheless* have a minimal presence in the production.

For the group of causal connectors, as a result, therefore and consequently were used in a majority for the learners when writing this piece of text, on the other hand, *thus* has a minimal appearance. Lastly, in the group of temporal connectors, finally has the highest presence in the written production, and subsequently, previously and meanwhile were the lest required in the written production (figure 5).

Figure 5. Discourse connectors used in the writing production by categories



Note. Results of the intervention on written production.

DISCUSSION

The results indicate that intensive reading practice affected writing performance positively in both the control and experimental groups. These findings are consistent with studies confirming that reading exposure contributes to writing improvement, as it provides learners with opportunities to be exposed to linguistic input, organizational models, and lexical resources (Graham et al., 2020; Grabe & Zhang, 2022).

However, the stronger correlation observed in the intervention group than in the control group suggests that not all reading input is equally effective at promoting academic writing development. Hence, this finding reinforces the argument that using discipline-relevant texts provides more transferable input for academic writing than general reading materials. This result aligns with Zhang et al. (2020), who emphasized that reading texts that resemble

the writing tasks students are expected to perform in their disciplines fosters important connections between input and output, facilitating transfer of learning.

According to Hyland (2021), explicit exposure to academic genres enhances learners' ability to reproduce disciplinary discourse conventions; hence, the use of scientific abstracts as reading resources becomes an efficient input, allowing learners to internalize rhetorical patterns and language structures central to academic writing. Considering this study's findings, the stronger relationship in the intervention group supports that reading-to-write instruction is most effective when reading tasks are explicitly linked to writing outcomes (Grabe, 2020).

Academic Writing Components

The analysis of academic writing components indicated that the intervention group outperformed the control group. The main differences were observed in rhetorical organization and the use of academic structures. These findings align with studies on the effects of genre-focused reading instruction, which conclude that it primarily affects higher-order writing features rather than lower-level linguistic accuracy (Biber et al., 2021; Cotos et al., 2022).

Regarding rhetorical organization, the improvement among students exposed to scientific abstracts can be attributed to the academic convention regarding its structure, which typically follows a predictable sequence (purpose, method, results, implications).

Therefore, the repeated exposure to this structure facilitated learners' understanding of how academic texts are logically organized and how ideas are organized to achieve communicative goals. This finding aligns with Hyland and Jiang (2021) and Kanoksilapatham (2022) found that students who analyze and emulate research genres show significant improvements in text organization and coherence in their writing.

Regarding academic structures, the frequent use of these in the intervention group's writing supports the effectiveness of abstract-based instruction. Considering that academic abstracts often contain features such as nominalizations, passive constructions, and reporting verbs, which are underused by EFL learners (Biber et al., 2021). Hence, the exposure to authentic academic texts facilitates the acquisition of such structures (Crosthwaite, 2020).

Discourse Connectors

Recent studies indicate difficulties among EFL learners, particularly when using discourse connectors appropriately (Yoon & Polio, 2021). The absence of connectors in the control group's written production suggests that general reading materials may not provide enough input for learners to notice and adopt these devices. Regarding connector types, the study showed that adversative and causal connectors were the most frequent. This distribution aligns with the functional demands of academic writing, particularly in argumentative and expository texts, in which contrast and cause–and–effect relations are central. These findings align with recent studies confirming that adversative and causal

connectors are the most frequent and rhetorically significant in research genres (Ädel & Erman, 2022; Lu & Deng, 2023).

Moreover, the preference for connectors such as in addition, moreover, as a result, therefore, and consequently demonstrated learners' acquisition of the formal register and academic discourses. These connectors are frequently used in academic abstracts and are associated with formal written discourse (Biber et al., 2021).

On the other side, the limited use of nevertheless, nonetheless, thus, and more complex temporal connectors indicates that learners may still experience difficulty with less frequent or semantically nuanced items. This finding is consistent with recent findings indicating that EFL learners tend to acquire high-frequency academic connectors earlier, while lower-frequency or pragmatically complex connectors require longer exposure and explicit instruction (Lu & Deng, 2023; Yoon & Polio, 2021)

CONCLUSIONS

It is clear that the use of abstract-based reading is effective in strengthening reading–writing integration in EFL academic contexts. They function as an effective bridge between reading input and academic writing output. Since abstracts are concise and authentic representations of academic discourse, they allow learners to engage simultaneously with conventional rhetorical organization and language features, considering the demands of academic writing in the discipline.

Consequently, a strong relationship is observed between reading and writing performance in the intervention group, which highlights the importance of aligning

instructional materials with expected learning outcomes. In addition, regular exposure to abstracts facilitated the internalization of rhetorical moves, academic structures, and discourse connectors, as evidenced in students' written work.

In addition to linguistic benefits, the use of abstract exercise motivational factors, such as abstracts related to students' disciplinary areas, increased their engagement, perceived relevance, and usefulness, factors known to positively influence learning outcomes in EFL settings.

As a conclusion, the abstract-based instruction offers an efficient and focused approach to developing academic discourse, particularly when accompanied by explicit guidance, genre-based analysis, and opportunities for written production. Despite these contributions, the study has limitations, the main one is the short intervention period. Therefore, future research should explore longer instructional periods, incorporate qualitative data to capture learners' cognitive and affective processes, and extend the investigation to diverse proficiency levels and disciplinary contexts.

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