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EDITED BY

Amelia Manuti,
University of Bari Aldo Moro, Italy

REVIEWED BY

Noble Lo,
Lancaster University, United Kingdom
Joselin Sandoval,
Catholic University of the Most Holy
Conception, Chile

*CORRESPONDENCE

Steffanie Kloss
✉ steffanie.kloss@uvm.cl

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Academic writing strategies in university students from three disciplinary areas: design and validation of an instrument

Sindy Sagredo-Ortiz¹ and Steffanie Kloss^{2*}

¹Facultad de Psicología y Humanidades, Departamento de Formación Integral, Universidad San Sebastián, Concepción, Chile, ²Centro Regional de Inclusión e Innovación Social, Universidad Viña del Mar, Viña del Mar, Chile

It is acknowledged that writing strategies are highly important not only for their usefulness in the process of text production but also for their value as a learning technique, as they involve the use of cognitive and metacognitive operations. Various international studies have validated scales to measure their use and have helped characterize expert and non-expert university writers. However, regarding specific strategies in Spanish as a mother tongue, further research is still needed in the context of higher education students. This study aimed to develop a standardized measurement instrument to identify university students' use of academic writing strategies according to disciplinary area. The sample consisted of 290 students from the Humanities and Social Sciences, Health Sciences, and Engineering from a regional university in Chile. A Likert-type scale was applied whose design was based on a thorough review of successful instruments from different parts of the world. The results indicate that the developed instrument is appropriate for higher education contexts and across different disciplinary areas.

KEYWORDS

strategies, academic writing, instrument, students, higher education

1 Introduction

Mastering academic writing is essential to become part of and remain within a specialized scientific community. Each discipline is characterized by its own conventions resulting from the interaction between individuals who share the same objectives (Bazerman, 2014). The role of writer within a discipline being studied is a highly demanding task for university students throughout their training process, as the requirements of academic writing involve cognitive and metacognitive, linguistic-discursive, emotional, and sociocultural aspects (Graham et al., 2017). Furthermore, it requires mastery of various strategies that enable written expression while adhering to the discursive conventions of each disciplinary area and the professional context in which graduates are expected to operate, demonstrating their graduate profile (Navarro et al., 2020).

Such a demonstration of expertise is mostly expressed through reading and writing, and those who assess these skills are professors who, in most cases, have had limited pedagogical training in how to teach writing. The situation becomes even more complex in the context of a university system that has grown and transformed over the past decades in Chile. It is well known that each year, universities welcome more students with diverse educational backgrounds, further diversifying enrollment, especially in Latin

America (Ávila Reyes and Calle-Arango, 2022). The current situation demands new and different forms of support to address this diversity. Although there are programs or courses offered in the early years of university, their availability will depend on the institutional projects of each university or even individual faculties or disciplinary areas, rather than the implementation of transversal plans.

It is also understood that the transition to higher education marks a fundamental milestone in each student's life, not only in terms of their academic development but also in the acquisition of essential skills for future professional performance. In this context, a strong foundation in writing serves as a fundamental pillar to tackle university challenges and build a career in both academic and professional fields. Authors such as Blake et al. (2014) and Wenzel et al. (2019) have emphasized the importance of a gradual transition and progression in writing preparation for university.

It is often claimed that students at various levels of education have not developed the necessary communication skills, particularly in written expression. However, this weakness becomes more evident among university students who are unfamiliar with the writing conventions of each discipline. Since these conventions are cultural practices constructed socially and historically, and in their situated nature, depend on actions and relationships with others within specific communities (Natale, 2013), they become even more challenging to master, especially in adapting to different discourse genres (Hyland, 2015) across various disciplines and institutional contexts (Kloss and Quintanilla, 2024; Sagredo-Ortiz et al., 2023).

Academic writing requires mastery of various strategies, including cognitive, metacognitive, linguistic-discursive, emotional, and sociocultural strategies, which arise as a result of the interaction of multiple contextual factors (Ávila Reyes et al., 2021). Likewise, it is essential to understand writing as a social practice; that is, it should be viewed in relation to its production contexts, the domain in which it is situated, and the relationship between writers and readers (Zavala, 2019).

An important aspect of higher education training relates to the use of writing strategies, which are defined as the procedures students use to write more effectively. Furthermore, they involve a plan of action and various tools to advance the development of the writing task and to monitor the process (Ibraimi, 2016; Khosravi et al., 2017).

There is a vast body of specialized literature indicating that expert writers engage in a recursive and interactive writing process. For them to become competent and flexible, they must engage in constant writing practice with the necessary support to master strategies that will help them improve the quality and effectiveness of their writing. Various questionnaires have been administered to explore students' use of writing strategies at both the cognitive level (Castelló, 2015; Meneses Báez, 2013; Pretic and Czarl, 2003; Raoofi et al., 2017) and in terms of metacognition and self-regulation (Farahian, 2017; Hammann, 2005). The results indicate that the greater the use of strategies, the more positive the disposition toward writing is. Based on this, there is a need for academic writing assessment instruments for specific areas and contexts, allowing for an in-depth examination of how students develop writing practices and master writing strategies.

2 Method

This article presents a non-experimental, quantitative study with an exploratory cross-sectional design, meaning that data were collected at a single point in time.

2.1 Participants

This study involved 290 university students from three disciplinary areas (Humanities and Social Sciences, Health Sciences, and Engineering) at a regional Chilean university. The students' ages ranged from 18 to 25 years, and they were in their first, second, or third year of study. The participants took part in different stages of the process (see Table 1).

Inclusion criteria of participants required that they had not previously studied a university major or taken training courses in academic writing. Additionally, they should not have been diagnosed with special educational needs (SEN), their native language should be Spanish, and they should not have received training in another country's educational system.

2.2 Data collection and analysis

The instrument was administered virtually via a Google Form. Response time to the questionnaire ranged between 15 and 28 min per participant. At the beginning of the questionnaire, participants filled in their personal information, read the general objective of the study, declared their voluntary participation, and then proceeded to complete and submit their responses.

Data collection extended over two consecutive semesters. Data was tabulated in a Microsoft Office Excel 2019 spreadsheet for subsequent analysis with SPSS software, version 26.

The Kolmogorov-Smirnov test was used to assess the normality of distribution. It was concluded that the data did not meet normality assumptions, with a statistical value of 0.116, significance level of $p = 0.001$, and Levene's Test result of $p < 0.05$. Therefore, non-parametric analysis was performed using Kruskal-Wallis test in SPSS version 26, test recommended for studies in the Social Sciences, given the nature of the data, which is sensitive to sample size and follows a free distribution (Berlanga Silvente and Rubio Hurtado, 2012). The nominal independent variable corresponds to the studied academic disciplines: humanities and social sciences, health sciences, and engineering. Meanwhile, the dependent variable, either ordinal or interval in nature, corresponds to the scores obtained in the questionnaire.

3 Results

In order to identify the use of academic writing strategies by means of university students' self-reports, 11 items were designed to form the Academic Writing Strategies Questionnaire (AWSQ). This instrument is a frequency-based Likert scale, where 1 corresponds to "never" and 5 to "always." Participants were asked to respond based on the prompt "Think about the instances in which

TABLE 1 Distribution of participants.

Stage	Proceeding	Participants
1. Instrument validation	Cognitive interview	20
2. Instrument piloting	Application of the instrument to determine reliability	70
3. Instrument depuration	Application of the Questionnaire of Academic Writing Strategies (QAWS)	200

you are required to produce academic writing for any university courses.” The items were adapted from validated instruments used in other contexts (Meneses Báez, 2013; Pretic and Czarl, 2003), and were selected for their relevance, given their application in higher education in areas similar to those in this study.

For the validation process, a cognitive interview was conducted to adjust vocabulary to the Chilean educational context. This was administered to 20 first-year university students, who were asked about their level of understanding of the statements. Additionally, they were required to explain in writing and orally what they found unclear and to suggest possible revisions for the wording of the propositions. Based on this feedback, confusing items were adjusted accordingly.

Next, a pilot test was conducted with 70 first-year students from a Humanities program, establishing a preliminary reliability index using Cronbach’s Alpha ($\alpha = 0.87$). Application time was measured in minutes, and participants’ questions regarding instructions were considered for clarity and improvement.

Subsequently, an Exploratory Factor Analysis (EFA) was performed to determine the number and composition of the explanatory factors needed to account for the common variance. For this analysis, 200 university students from various disciplines (Humanities and Social Sciences, Health Sciences, and Engineering) were included. These students, who were in their first to third years at higher education institutions in the town of Concepción, were not part of the final study sample. The sample adequacy measure (KMO = 0.85) indicated that the analysis was viable. Additionally, Bartlett’s Test of Sphericity yielded a value of $X^2(12) = 153.72$, $p < 0.5$, supporting the suitability of the data for factor analysis.

To identify the underlying structures within the collected dataset, an Oblimin rotation was applied, assuming that the factors are correlated between them.

Table 2 presents the rotated components using Kaiser Normalization. Factor loadings with a magnitude of 0.4 or higher for each factor in the questionnaire are highlighted in bold. Based on the analysis, the items were grouped according to the dimensions they referenced. Factor 1 consisted of five items (“I revisit the draft later to improve it,” “I check whether my text meets the requirements,” “I ensure that my writing resembles texts from my disciplinary field,” “I adjust my text to fit the communicative purpose,” “I show my text to someone to ask for their opinion”). This factor was labeled “rhetorical strategies,” as it relates to the writer’s actions to adapt to the communicative situation to organize and present their ideas according to writing conventions that are accepted by the speakers and recipients of their community. They

TABLE 2 Rotated component matrix.

Items	Components		
	Factor 1	Factor 2	Factor 3
Question 9	0.872	0.424	0.389
Question 8	0.727	0.363	0.372
Question 10	0.760	0.399	0.433
Question 7	0.607	0.290	0.383
Question 6	0.586	0.346	0.394
Question 4	0.330	0.676	0.259
Question 11	0.374	0.650	0.144
Question 3	0.282	0.568	0.237
Question 1	0.291	0.161	0.569
Question 5	0.368	0.369	0.466
Question 2	0.451	0.278	0.718

Source: Own elaboration based on SPSS version 26.
Bolded values indicate the highest factor loading for each item across the three extracted components. These values reflect the strongest association between each item and its corresponding factor, guiding the interpretation of the underlying factor structure.

are directly related to the topic, purpose, and audience (Mu and Carrington, 2007).

Factor 2, labeled “writing strategies,” included three items (“I modify the content or ideas in my text,” “I review my professor’s feedback,” “I modify the order of sentences or paragraphs in my text.”). These items refer to the actions writers use to organize and express their ideas effectively. They require attention to both the internal textual organization norms of a semantic nature and to the external ones of a structural order (Didactext, 2015).

Finally, factor 3, labeled “editing strategies,” consisted of three items (“I read my text aloud as I write,” “I make changes in vocabulary according to the disciplinary field,” “I focus on one aspect at a time when reviewing.”). These items relate to the evaluative steps a writer takes to improve clarity, coherence, accuracy, and overall quality of their text. It involves considering changes to the written text to improve some aspects of it (Zhou, 2023).

Subsequently, a Confirmatory Factor Analysis (CFA) was conducted using SPSS AMOS version 26. Three models were tested: unidimensional, bidimensional, and tridimensional (see Table 3). The bidimensional structure (writing strategies and rhetorical strategies) showed the best fit because it allowed for the identification of latent variables based on the correlation between the factors, with an appropriate reliability index ($\alpha = 0.803$). Additionally, the Omega index (0.810) was calculated to assess the instrument’s sensitivity to the total number of items.

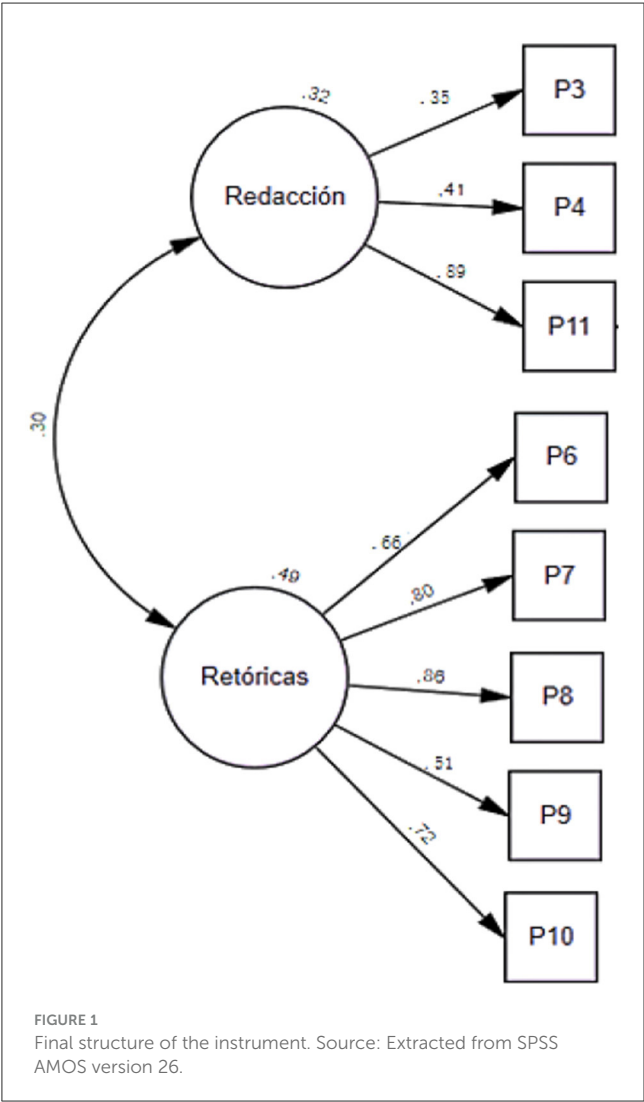
The instrument was ultimately composed of 8 items. Items with low correlation (<0.3) were removed, as well as those that, from a theoretical perspective, did not accurately measure the studied construct, since they were not considered latent variables. The final structure is presented in Figure 1.

Figure 1 shows that the items have a factor loading of 0.3 or higher, which allows for the satisfactory formation of the first factor, with three items (“I revisit the draft later to improve it,” “I check whether my text meets the requirements,” “I rewrite my

TABLE 3 Goodness-of-fit indices for the CFA.

X2	CMIN	GFI	AGFI	RMR	RMSEA	CFI	NFI	TLI
40.8	2,268	0.954	0.907	0.036	0.008	0.955	0.940	0.930

Source: Own elaboration based on SPSS AMOS version 26.



text, emphasizing key ideas.”). From a theoretical perspective, these are referred to as writing strategies (Didactext, 2015) because they are closely related to the implementation of crucial evaluative steps that lead to refining the written work until the production of the final version.

The second factor, called rhetorical strategies (Abdollahzadeh, 2010; Mu, 2005; Mu and Carrington, 2007), consisted of five items (“I write while considering the characteristics of my audience,” “I write while keeping in mind the communicative purpose of my text,” “I write while thinking about the vocabulary and style appropriate for my audience,” “I write my text with the reader’s comprehension in mind,” “I check whether my text is understandable to the reader.”). These items align with the underlying approach of this research, as they are directly related to the effectiveness of writing in relation to the communicative situation, that is, the topic, purpose, and audience, considering the context-situated nature of writing in Higher Education.

4 Discussion and conclusion

A self-report questionnaire was used, with a design based on existing instruments and validated within the local university context. Based on the validation process, it can be concluded that the items within the instrument are appropriate and consistent. This conclusion aligns with the Exploratory Factor Analysis (EFA), which aimed to identify the underlying structure of the data by grouping items according to their factor loadings. This was further ratified through Confirmatory Factor Analysis (CFA). This approach enhances validity of application models and highlights the importance of relationships between evaluation factors. Additionally, it allows for the reinterpretation of variables to ensure the relevance, coherence, and quality of the instrument by classifying items and identifying those requiring modifications or those that fall outside the estimated dimensions, thereby facilitating the replication of this questionnaire.

It is important to note that the validated instrument aligns in its factorial structure with English-speaking studies conducted in second-language contexts (Farahian, 2017; Raoofi et al., 2017), which have explored the use of writing strategies from a cognitive and metacognitive perspective. It also aligns with research carried out in Spanish-speaking contexts where Spanish is the first language (Castelló, 2015; Meneses Báez, 2013), from a more sociocultural perspective.

Firstly, regarding the results of the application, it was found that no significant difference was identified in the use of rhetorical vs. writing strategies. This may be attributed to the fact that university students from different disciplines undergo an enculturation process in Higher Education that is, they gradually assimilate the communicative conventions of the academic environment in which they are immersed. As a result, their conscious use of these strategies develops progressively (Natale, 2013).

The above aligns with Latin American studies indicating that novice writers perceive writing as an individual, instrumental, and decontextualized activity, without considering it a learning strategy (Sagredo-Ortiz et al., 2023; Kloss and Quintanilla, 2023). This is how we observe little planning of ideas and ineffective revision techniques, being rather intuitive or self-managed practices, which students deploy given the need to overcome the obstacles that academic writing implies in their disciplinary area (Ávila-Reyes et al., 2020).

One possible reason for the lack of conscious use of writing strategies may be the limited explicit instruction received at both previous and current levels of training, along with the minimal transfer of knowledge to specific disciplinary fields (Ávila Reyes et al., 2021). This transfer does not occur automatically, as it requires a mediator, which can be explained through the scaffolding process from classic sociocultural learning theory (Vygotsky, 1981). This situation may improve as students progress in their education, as they become aware of writing as a learning tool with discursive, pragmatic, and epistemic functions, which also grants them access to the academic community (Blake et al., 2014).

Secondly, engineering students reported a self-perception of low strategy use, in contrast to Health Sciences students, who highly value their writing practices. A possible reason for this in Engineering may be the lack of interaction between everyday writing practices and the limited importance assigned to writing in higher education compared to other academic practices, which alone are not sufficient to improve performance. This may lead students to develop an uncritical and isolated view of academic culture and disciplinary writing (Zavala, 2019). Therefore, there is a call to reaffirm the value of these practices and incorporate them into the university classroom to enhance the dialogic and interactive nature of writing.

Based on this finding, it is possible to highlight the need for explicit instruction for the academic staff, regardless of their disciplinary area, with the aim of guiding pedagogical aspects that support the development of academic writing. Previous studies in this area have shown that teacher feedback becomes essential for shaping writers in the university classroom (Sagredo-Ortiz et al., 2023).

Thirdly, regarding writing strategies as self-managed and collaborative practices, some similarities can be identified across disciplines. These reflect vernacular practices, which are more characteristic of everyday and informal contexts rather than academic ones. However, they influence specialized domains, especially in the absence of explicit instruction in writing strategies.

In this regard, certain similarities were observed, such as students commonly engaging in summarization, using graphic organizers, and note-taking, consistent with the findings by Rosso et al. (2021). Additionally, collaborative writing and participation in social networks are strongly present, reflecting the digital era of today (Boyd, 2015). However, a distinctive feature in Health Sciences is the highlighting of key ideas. This can be explained by the specific task demands of each field and students' study habits, where the epistemic function of writing becomes more meaningful, as writing serves as a mediator for learning (Navarro et al., 2021).

In line with the previous idea, it is understood that students are malleable even in their writing practices; however, they require explicit instruction tailored to their disciplinary field. This perspective aligns with the idea that strategies, as a sequence of cognitive and linguistic activities, function as flexible mediators to achieve the purpose of the assigned writing task, meaning they help guide students toward their goal (Hayes, 2012; Ibraimi, 2016; Khosravi et al., 2017). However, achieving this requires facilitators such as family, peers, instructors, and continuous feedback (Ávila Reyes et al., 2021), since writing strategies can be learned and, therefore, they can be taught by a mediator who supervises, guides, and supports students targeting specific skills.

In this way, addressing the specific contents of each discipline requires the proposal of writing activities tailored to the expected performance of students (Wenzel et al., 2019). It is therefore essential to raise awareness among subject-area instructors about the connection between thought and written language in each field and level, with the aim of promoting didactic and evaluative strategies that will enhance students' writing performance. This is because it has been proven that expert mediation favors the appropriation of disciplinary genres within each academic community, and that writing competence is an integral part

of instructional processes, serving as a requirement for the professional field across different disciplines (Bazerman, 2014).

This research represents progress in the development of instruments for identifying the academic writing strategies used by Higher Education students. The application of the CEEA allows for the characterization of writers' profiles based on the discourse community they aspire to join. Additionally, it is considered a valuable resource for implementation in other areas and institutional contexts. In this way, its use can provide clear guidelines for making decisions regarding writing practices in the classroom and their instruction, based on the dimensions in which students show higher or lower levels of achievement. Such input would make it possible to address their needs for direct instruction on writing strategies.

Finally, it would be interesting to extend this line of research in future projects to further explore university students' vernacular and self-managed writing practices, to determine which of them persist over time, which are subject to change, or whether they transfer to the academic sphere through teacher-led instruction.

It is worth noting that the use of writing strategies in Higher Education is currently being mediated by various emerging technologies, such as Generative Artificial Intelligence (GAI), which provides students with effective feedback to improve their academic writing (Lo et al., 2025). Therefore, this instrument can also contribute to the modeling of specific techniques for training writers, including the use of such instructional resources.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Universidad Católica de la Santísima Concepción, number 14/2020. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

SS-O: Data curation, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. SK: Conceptualization, Funding acquisition, Project administration, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1600497/full#supplementary-material>