

An insight into Algerian Researchers' Scientific Writing Skills: Move Analysis of Biology-related Research Article Introductions from the ASJP Database

رؤى حول مهارات الكتابة العلمية: تحليل الأساليب البلاغية في مقدمات المقالات العلمية للباحثين الجزائريين في مجال البيولوجيا

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Abstract:

This study examines the rhetorical moves in research article introductions written by Algerian researchers in Biology. The corpus consists of 30 introductions extracted from scientific articles published in local journals between 2020 and 2025. Purposive sampling was employed to select research article introductions that were suitable to the study. The CARS model of Swales (2004) was used for the genre analysis. The results revealed that Algerian researchers in the field of Biology follow this model when writing their articles. However, they need to raise their generic awareness about some moves and steps. The results of this study can be applied to improve the scientific writing skills of EST learners by integrating move analysis into course design.

Key words: rhetorical moves; Biology; scientific writing skills; genre analysis; EST learners.

ملخص:

يتناول هذا البحث دراسة الأساليب البلاغية في مقدمات المقالات العلمية المكتوبة باللغة الانجليزية من طرف باحثين جزائريين في مجال البيولوجيا. عينة الدراسة تتضمن 30 مقدمة لمقالات علمية مأخوذة من مجلات وطنية. نموذج CARS لـ Swales (2004) استخدم لتحليل النصوص. بينت النتائج أن الباحثين الجزائريين يتبعون هذا النموذج لكنهم بحاجة إلى تعزيز وعيهم ببعض الأساليب البلاغية. هذه النتائج يمكن أن تساهم في تحسين مهارات الكتابة العلمية لطلاب اللغة الانجليزية المتخصصة بإقحام تحليل الأساليب البلاغية في البرامج التعليمية للغة الانجليزية المتخصصة في التعليم العالي.

كلمات مفتاحية: الأساليب البلاغية، البيولوجيا، مهارات الكتابة العلمية، تحليل النص، طلبة ل م.

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1. Introduction

Most journals publish scientific articles in English, as it has become the global language of science and technology. As a result, research articles written in English have become a powerful tool for distributing scientific knowledge among academics and researchers worldwide. Writing eligible research articles in English has been playing an essential role in researchers' academic and professional success. Lack of scientific writing skills generally affects researchers' reputation and careers.

To write effectively, academic writers should know from the beginning about their audiences' requirements. The primary audience for academic writers is peers and colleagues who want to know about the research results; however, they should first meet the journal editors and referees' requirements (Cargill & O'Connor, 2009). They should respect the journal's guidelines when writing their articles to increase the chance of their papers' acceptance for peer review and have more opportunities to publish their manuscripts. In addition, they should consider the readers' familiarity with the subject and their purposes for reading the articles. This helps them select appropriate language, content, and way of presenting information to the intended audience. When authors fail to present well-organized papers by adopting well-defined strategies to present information to the readers, they may fail to keep them interested in their writing. They generally follow established conventions when writing to increase their research articles' readability among peers and field experts. When a paper is of high quality, it may be published in accredited journals and widely read and cited by many readers.

Writing research articles remains a main interest among linguists, educators, and scholars. According to Swales (1990), a research article is a genre, and it is defined by its communicative purpose and linguistic and rhetorical features conventionally shared by discourse community members. He defines discourse communities in (Swales, 1990, p. 9) as "*socio rhetorical networks that form in order to work towards sets of common goals*". These goals refer to discourse community members' shared communicative purposes, which are the critical elements in defining a genre, or from Bathia's perspective, communicative purposes shape the genre and give it an internal structure (Bhatia, 2017).

According to Swales (1990), a discourse community is characterized by members with mutual public purposes registered officially or deduced implicitly. The community members use specific mechanisms, such as public meetings, newsletters, or other communication devices, to communicate among themselves. They use these mechanisms to transmit or receive information. Discourse membership depends on creating opportunities to exchange information. In addition, a discourse community uses a genre (or more) to carry out its members' communicative practices, and it develops specific sets of lexis or terminology because of the diversity of topics among different communities. Finally, a discourse community has a limited rate of members owning an appropriate level of related content and expertise.

The idea of a discourse community is essential to genre knowledge to join writers, texts, and readers together (Hyland, 2004). Genre knowledge involves understanding the expectations of the discourse community readers and the conventions related to language, form, and genre rhetoric developed over time (Dudley-Evans & St John, 1998). Members of a community easily recognize similarities in the texts they use frequently. To help readers understand what they read, a writer must anticipate their expectations based on their experiences with similar texts; writing is a practice based on expectations (Hyland, 2004). When information is placed where the readers expect to recognize it, they will understand it more easily; therefore, writers need to be aware of how information should be located. This helps them control the readers' recognition and emphasizing of each piece of information (Gophan & Swan, 1990). So, genre theory focuses on how a text is constructed and how it is likely to be interpreted, utilized, and exploited to realize specific goals in particular contexts (Bhatia, 2017). In this vein, writing is an interactive act. According to Hyland (2004), a text is meaningful and communicative only when it reflects the patterns and conventions of the

community it is written for (Hyland, 2004). Therefore, awareness of these patterns and conventions is important for academic writers to be effective members of the academic community .

A researcher should follow conventions of content organization. In other words, how the content should be presented in different sections of a scientific paper, and how information should be distributed across sections of a manuscript. In this context, authors should use a unified framework for every section commonly known to the readers. This framework is usually followed by other writers in the same field of interest; As (Gophan & Swan, 1990) noted, when the sections' organization is confusing, readers are confused.

In higher education, researchers, as teachers and postgraduate students, need to write as experts, using an academic style and genre. However, they usually ignore how to apply the rhetorical strategies of genres of their disciplines. So, it is vital to provide them with training in academic writing, especially during their postgraduate studies. In addition, they need to receive guidance and contrastive feedback by language experts. Lack of guidance when writing their scientific papers increases the possibility of writing low-quality papers, reducing the chances of publication in accredited journals.

The genre-based approach provides insights into the rhetorical organization of different sections of research articles facilitating both the writing and reading of scientific papers. Many studies have been conducted to analyze the abstract section such as (Martin, 2003; Santos, 1996), the discussion section such as (Hopkins & Dudley-Evans, 1988; Yang & Allison, 2003) and the results section such as (Brett, 1994). According to (Bruce, 2008, p. 14), genre analysis under the ESP genre-based approach tradition involves investigating "*the organization of the conventionally recognized stages of a text in terms of moves and steps*" for the purpose of teaching the language and the rhetorical patterns related to the examined genres.

One of the pioneers of genre-based studies was Swales (1990). He introduced genre analysis to study the discourse structuring in different disciplines focusing on the rhetorical features of genres, including RA (research article) introductions. He argued that the introduction is considered the most complex section in a research article with IMRAD (Introduction, Methods, Results and Discussion) standard structure. Focusing on the RA introduction section, he proposed the CARS (Creating A Research Space) model of analysis to describe the rhetorical structure of texts. Therefore, Swales' genre analysis is appropriate for this study as we aim to analyze the introductions of Algerian researchers' scientific articles in Biology for pedagogical purposes.

Researchers have adopted the CARS Swales' model to analyze genres, such as scientific articles, doctoral dissertations, and Master's theses. As shown by Swales (1990) , this model categorizes a series of discourse units with specific communicative functions, which are presented as moves and steps; each move may contain one or several steps.

Several studies have been conducted to examine the rhetorical moves of the RA introductions of different scientific and engineering fields using Swales' model for move analysis .The CARS model has been used to analyze genres of a particular field, such as Biology, computer sciences, engineering, and technology, as well as their sub-branches, or to study the variation of genres and sub-genres across disciplines. Samraj (2002) reported on an analysis of research article introductions from Wildlife Behavior and Conservation Biology fields. Kanoksilapatham (2012) studied the rhetorical structure of RA introductions from three engineering sub disciplines; civil engineering, software engineering, and biomedical engineering. Suryani et al. (2014) analyzed the rhetorical moves of RA introductions of Malaysian non-native writers in computer sciences. Rahimi and Farnia (2017) analyzed dentistry research article introductions in English and Persian. Behnan and Nikokhesal (2017) examined RA introductions in physical and social sciences to discover the frequency of moves and steps in the two disciplines' introductions.

However, a few studies on the rhetorical move analysis of research article introductions (RAIs) were conducted in the Algerian context, especially in EST (English for scientific and technical purposes). This study examines the rhetorical moves of the Algerian Biology researchers' RA introductions to answer the following question:



Do the Algerian researchers follow the CARS model of Swales (2004) when writing their research article introductions in Biology?

The present research examines the rhetorical structure of the RA introduction as a particular type of text, so, genre analysis may apply to this study. Swales' revised model CARS (2004) was used to analyze the corpus. This genre analysis model helps the researcher describe how data is distributed and ordered in typical texts of different disciplines. This study gives insights into how researchers in scientific fields can write good articles. In addition, the reported results can be used when designing ESP courses and teaching materials to improve the scientific writing of EST learners in higher education.

2. Swales genre analysis: Create A Research Space Model (2004)

Swales developed a genre analysis system, which he applied to research article introductions from various disciplines. His work led him to propose the CARS model (1990), which has been widely adopted by scholars and researchers in discourse analysis. Based on the findings of genre studies done by other researchers using the CARS model (1990) in various disciplines, this model was revised in (2004).

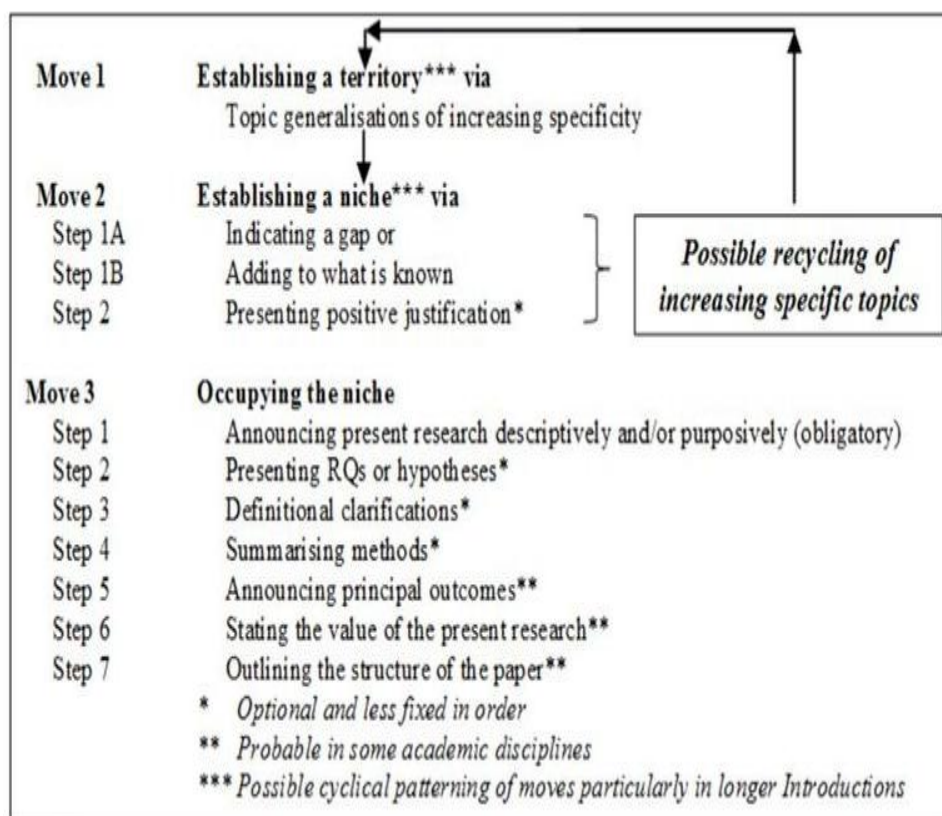
As shown in Fig. 1, the introduction consists of three principal moves, which are the original moves in the CARS model (1990).

Move 1, establishing a territory, which can be realized via the Topic generalization of increasing specificity step.

Move 2, establishing a niche, which consists of an obligatory step- indicating a gap or adding to what is known- and an optional step (presenting positive justification). At this level, moves and steps can reoccur through 'recycling' as mentioned in the diagram.

In addition, the model proposes seven steps for Move 3, occupying the niche. Step 1, announcing the present research, which is obligatory and can be realized purposefully or descriptively. The remaining six steps are optional. Steps two, three, and four -presenting RQ or hypotheses, definitional clarifications, and Summarizing methods, respectively- are less fixed in their order when accruing than the other steps. Finally, steps five, six, and seven- announcing principal outcomes, stating the value of the research, and outlining the structure of the paper, respectively- can occur in some academic disciplines as shown in the diagram.

Figure 1. Swales CARS model



Source: Swales, 2004, p232.

3. Methodology

Genre analysis, specifically the “Creating A Research Space” framework of analysis, examines how standard texts are structured. Using this analysis model, we aimed to discover how Algerian researchers in Biology distribute information when they write their introductions, depending on determining discourse units with particular communicative functions that contribute to realizing the writer's objective, namely moves and steps, therefore, this study is qualitative . However, it is also considered quantitative as it shows the frequency of moves and steps in the researchers’ introductions.

3.1. The study

The study aims to answer the following research question: *Do Algerian researchers follow the Swales CARS framework when writing their research article introductions in Biology?*

The corpus of this study consists of 30 introductions of research articles written by Algerian researchers in the field of Biology, published in four local journals from ASJP (Algerian Scientific Journals Platform) in scientific fields. Biology was chosen as it is a discipline with an expanding body of empirical research that produces a rich and accessible corpus for genre analysis. All articles available in the ASJP database within the scope of the study were included . So, a total of 37 Biology- related research articles written in English and published in the period of the study were downloaded ; however, 7 were excluded for not meeting the sampling criteria, resulting in a final corpus of 30 research articles. The study employed purposive sampling based on predefined criteria, such as IMRAD structure, authorship and period of publication, to select articles relevant to the study objectives; articles related to Biology and written in IMRAD structure were intentionally included in the study to maintain disciplinary and structural consistency for Move analysis. In addition, articles involving non-Algerian co-authors or attributed to co-authors specialized to other fields ,such as physics or chemistry, were excluded to better reflect Algerian

researchers' scientific writing practices in the same field. The study period was between 2020 and 2025 to ensure the study reflects recent scientific writing practices in an Algerian context. The language style used by the researchers was a challenge faced by the researcher; since this study was not concerned with language analysis, we accepted articles with an acceptable level of language style.

Table 1. The corpus of the study description

Journal title	Number of articles	Period of publication
Algerian Journal of Bio-sciences (AJB)	5	2020
Agrobiologia	14	2021- 2023
Applied Biology in Saharan Areas	5	2020-2023
Agropastorials scientia	6	2024-2025
Total	30(100%)	2020-2025

Source: Prepared by the researcher based on the study corpus.

The Swales CARS model (2004) was used as the main analytical framework to identify rhetorical features of the introductions selected for this study. The articles were downloaded and printed, and the analysis was done on printed papers. All the articles were coded (Art1, Art2, Art3.....) to facilitate the analysis process. Each introduction was segmented into meaningful discourse units that were identified according to their communicative functions in the RA introductions. These units were first coded (M1, M2,M3) and then assigned according to the main moves of the CARS model. After, each move was analyzed to identify steps, which were also coded (M1S1,M1S1A, M1S1B, M1S2, M2S1...) and identified . In identifying different moves and steps, we relied on the content and some linguistic cues, such as verb forms, adjectives, or technical terms -as shown in (Swales, 1990, 2004). The linguistic cues were first highlighted, and then the moves and steps were assigned according to their occurrence and function in the corpus. After coding and assigning the moves and steps depending on both linguistic components and meaning interpretation within the introductions, the frequency of discourse units was shown to determine their distribution within the introductions of the corpus. Finally, Move-steps' patterns were written to determine the organizational structure of each introduction as in the pattern (M1-M3S1-M3S1-M3S1-M3S4-M3S3-M1-M3S4-M3S1).

4.Results Analysis

The results of the genre analysis are shown in Table 2. The data gathered from the analysis indicates that the structure of most RA introductions follows the Swales CARS model (2004), consisting of the moves and steps proposed by this analysis model. However, not all the introductions contain the three moves; Move2 is absent in six introductions and it is presented in most of the remaining introductions through indicating a gap by highlighting limitations of previous studies. Some introductions contain the step 'adding to what is known', with the purpose to demonstrate the study's contribution in the existing body of knowledge. Some researchers presented positive justifications to outline the importance of their studies and their motivations. Move 1 occurs in all the introductions to establish the background of the research. Researchers presented general knowledge in their field , highlighting the significance and complexity of the research topic. They used general statements with *increasing specificity* when presenting the research topic, stating previous studies to support the theoretical background of their research works. Move 3-step 1 (to announce the purpose of the research purposefully or descriptively), is present in all the introductions. Eight authors included Move3-Step 4 by summarizing the methods of their studies. Whereas Move3-Step 5(announcing the principal outcomes of the paper) is found in one article and the same applies to Move-3Step 7 (outlining the structure of the paper). Move3-Step 6, which is stating the value of the research, is used in four introductions. Recycling of M1 and M2 exists in most introductions, especially before announcing Move 3. Overall, all the papers open with M1 and close with M3. We observed that some introductions

were very long; however, M1 took the lion's share. The writers of these introductions presented knowledge related to the topic drawing on many previous studies found in the literature. They also defined terms and phenomena related to the topic. Ignoring some optional steps, especially concerning M3 has resulted in a lack of information in several aspects that could be useful to the reader.

Table 2. Move-step occurrence in Biology RAIs

Article	M1-S1	M2-S1A	M2-S1B	M2-S2	M3-S1	M3-S2	M3-S3	M3-S4	M3-S5	M3-S6	M3-S7
Art1	*				*						
Art2	*	*			*						
Art3	*	*			*						
Art4	*	*			*						
Art5	*				*			*			
Art6	*	*			*			*			
Art7	*				*						*
Art8	*	*		*	*						
Art9	*	*			*						
Art10	*		*		*						
Art11	*	*			*						
Art12	*				*						
Art13	*				*						
Art14	*			*	*						
Art15	*	*	*	*	*			*	*		
Art16	*	*		*	*			*			
Art17	*			*	*	*					
Art18	*		*								
Art19	*			*	*			*			
Art20	*		*		*						
Art21	*			*	*						
Art22	*			*	*						
Art23	*			*	*		*	*		*	
Art24	*				*						
Art25	*			*	*					*	
Art26	*	*		*	*			*			
Art27	*	*			*					*	
Art28	*			*							
Art29	*	*			*		*	*			
Art30	*	*								*	

Source: Compiled from the analyzed corpus by the researcher.

The following extracts from the introductions of the corpus are used to show how different moves and steps were realized (extracts are kept brief for analytical focus).

Move 1: Establishing a territory via "Topic generalizations of increasing specificity"

As shown before, this obligatory move requires that researchers report knowledge of their field, providing the necessary background of the research. This move implies making general statements about current knowledge/practice in the field or general statements of phenomena (Swales, 1990, 2004). To realize this move, the authors of the articles in this study used the present simple tense to report their general knowledge in their field and some linguistic cues that helped us to identify M1 statements, such as "known" and "debated" to present current knowledge statements, "are... used to" to describe statements of practice,

and “*reduced*” and “*is... caused*” to describe phenomena. The authors also used non-integral citations to refer to previous studies in the introductions.

- Art10: “.....has been a known field of research since.....”
Art11: “ a mechanism of.....remains highly debated.....”
Art5: “toxic chemicals that are widely used in agriculture.....”
Art1: “is caused by lack of.....”
Art12: “...significantly *reduces* growth and productivity”
Art27: “ AS is widely used in.....”
Art21: “Actynomycets are *well-known* for”
Art22: “ This phenomenon *is caused* by”

Move 2: Establishing a niche

In this study, writers who established a niche for their studies by using M2S1A, which is “indicating a gap” used some linguistic exponents, such as “*limited*”, “*fail*”, “*a few* (studies, works)”, and “*have not well/yet*”, as mentioned in (Swales, 1990) and found in the corpus (extracts are kept brief for analytical focus).

- Art9: “Research about.....*is limited*. ”
Art3: “.....farmers *fail* to apply.....”
Art2: “Only *a few* works have been conducted”
Art6: “.....genetic diversity of lettuce *has not been* well assessed.”

The following extracts were taken from the introductions of some authors who established the niche by using M2S1B, which is “adding to what is known”, or “extending the previous studies”.

- Art10: “The application of requires *further* studies ...”
Art15: “There is *an important need* to investigate using new technologies”
Art20: “ *In the aim of continuing on this line of research*, this study aims to determine, *for the first time*, the”

Move 2-Step 2, “Presenting positive justification”, is an optional step to express the writers’ motivation or reason to conduct the studies. These examples were taken from the corpus

- Art14: “*In order to*....., this work has been developed.”
Art8: “*Our interest in this work comes from these observations*...”
Art16: “The absence of such studies in Algeria *motivated us to study*”
Art 23: “ main flaws*from which the idea of this study emerged*”
Art27: “*here comes the interest of this study*”

At this level, recycling of M1 and M2 occurred before announcing M3 in some introductions, especially lengthy introductions. The authors presented extra details, definitions, illustrations, previous studies, and conclusions after establishing the niche. For instance, the pattern M1-M2S1A-M1-M3S1 was found in the RA9 introduction, the pattern M1-M2S1B-M1-M3S1 appeared in the Art10 introduction, and the pattern M1-M2S1A-M1-M2S1A-M2S2-M3S1-M3S4 was found in the Art16 introduction. Citation was used in this part of the introductions, as suggested by Swales.

Table 3. Moves-steps’ patterns

Articles' codes	Moves' patterns
Art1	M1-M3S1
Art2	M1-M2S1A-M1-M3S1
Art3	M1-M2S1-M3S1
Art4	M1-M2S1A-M3S1
Art5	M1-M3S1-M3S4
Art6	M1-M2S1A-M3S1-M3S4
Art7	M1-M3S1-M3S7
Art8	M1-M2S1A-M1-M2S1A-M2S2-M3S1
Art9	M1-M2S1A-M1-M3S1
Art10	M1-M2S1B-M1-M3S1
Art11	M1-M2S1A-M1-M3S1
Art12	M1-M3S1
Art13	M1-M3S1A
Art14	M1-M2S2-M3S1
Art15	M1-M2S1A-M1-M2S1A-M2S2-M2S1B-M3S1-M3S4-M3S5
Art16	M1-M2S1A-M1-M2S1A-M2S2-M3S1-M3S4
Art17	M1-M3S3-M3S1-M3S2
Art18	M1-M2S1B
Art19	M1-M2S1B-M3-M3S4
Art20	M1-M2S1B-M3S1
Art21	M1-M2S2-M1-M3S1
Art22	M1-M3S1-M2S2-M3S1-M1-M1-M2S2
Art23	M1-M3S1-M3S1-M3S1-M3S4-M3S3-M1-M3S4-M3S1
Art24	M1-M3S1
Art25	M1-M2S2-M3S1-M2S2-M3S6
Art26	M1S1-M2S1A-M2S2-M3S1-M3S4
Art27	M1-M2S1A-M3S1-M3S6
Art28	M1-M2S2
Art29	M1-M2S1-M3S1-M3S6-M2S1
Art30	M1-M2S1A

Source: Compiled from the analyzed corpus by the researcher.

Move 3: Occupying the niche

All the researchers announced their research purposefully or descriptively. So, obligatory Move 3-Step 1, was present in all the introductions, as found in the corpus (extracts are kept brief for analytical focus).

Art7: "The objective of this work is to study"

Art9: "we tend to investigate"

Art10: "This study aimed to"

Art13: "The current study established a....."

Art26: "The aim of this work is to discover....."

Art29: "Our study therefore aims to contribute to.....; the main objective is to refine the"

Furthermore, as shown before, Swales suggested that Move 3 can be accomplished by using optional steps (Step 2, Step 3, and Step 4) or probable steps in some fields (Step 5, Step 6, and Step 7). In this path, Move 3-Step 4, for instance, was adopted by many writers and they summarized the methods used in their studies using technical words such as: "assessed", "measuring", "using", "technique", "evaluated", and "analysis", as proposed by Swales (2004), as in these extracts of the corpus:

Art5: "several markers of were assessed by measuring"

Art6: "These are powerful techniques used to"

Art16: "The differences ...have been evaluated using PCA Analysis."

Art23: “ by bacteriological analysis.....”

Art26: “.....using questionnaires.....”

Conclusion

As previously mentioned in this study, we demonstrated the results of analyzing Biology-related research article introductions written by Algerian researchers. Swales CARS model (2004) was adopted for the analysis. According to what has been found in this study, the effectiveness of this model has been proven in describing the rhetorical organization of the corpus introductions. The results have shown that most Algerian researchers in this study follow the Swales move analysis framework by including the proposed moves and steps.

Despite this, there is a lack in the application of Move 2 in some introductions and Move3 steps that, despite being optional, may present important illustrations of the study to the reader. Therefore, researchers need to be aware of the generic structure of research article introductions, and the remaining sections, in their disciplines. The results of such studies help researchers of scientific fields to be acquainted with a practical framework for writing their articles effectively. In addition, the results of this study, and similar studies, are beneficial for ESP teachers to know the needs of researchers in terms of scientific writing and design appropriate ESP courses to improve their skills, especially in the Algerian context. Acquainting non-native writers with the rhetorical conventions of genres of their disciplines helps them produce articles that meet academic expectations and communicative writing standards in academic contexts. This provides them with more opportunities to publish their findings in scholarly journals and distribute scientific knowledge.

This study focuses on one section of research article; further research is recommended on the remaining sections to identify the researchers' weaknesses in scientific writing in the Algerian context. Moreover, analyzing articles of different specialties and taking the results of these studies into account when designing ESP courses, will be beneficial for ESP learners and researchers to improve their writing skills and help them become influential members of their discourse communities.

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