Chabahar Maritime University
Iranian Journal of English for Academic Purposes ISSN: 2476-3187
IJEAP, 2025, 14(1), 127-141 (Previously Published under the Title: Maritime English Journal)

A Rhetorical Examination of Introductory and Concluding Sections in Interdisciplinary Scholarly Publications

[1]Farzaneh Shadloo
[2]Behzad Ghonsooly*
[3]Alireza Jalilifar

Research Paper IJEAP-2411-2100 DOR: 20.1001.1.24763187.2025.14.1.7.9
Received: 2024-11-27 Accepted: 2025-03-01 Published: 2025-03-30

Abstract: The study of genres has grown in importance in the realm of academic writing during the last few decades, and move analysis and identification in particular has been the focus of many research studies due to their impact on overall quality of writing in academic papers. This exploratory study seeks to examine the structural arrangement of moves within the introductions and conclusions of research articles in interdisciplinary fields. Two datasets of English research articles consisting of 90 introductions and 90 conclusions representing interdisciplinary fields were compiled. The research articles were selected from three modes of interdisciplinarity based on Barry and Born's (2013) model. Then, the dataset was examined using two frameworks: Ruiying and Allison's (2003) model for analyzing conclusion parts and Swales' genre analysis approach (2004) for identifying structural patterns in introductory sections. Analysis of the current study revealed that the introductions and conclusions follow a consistent rhetorical structure in research articles from interdisciplinary fields with respect to models adopted in the current study, and all the three moves in both Introduction and Conclusion sections are found to be obligatory. Nevertheless, differences in the present corpus are also spotlighted particularly with regard to move sequences. The results have implications for English for Specific Purposes professionals to train new researchers to publish successfully in interdisciplinary fields and assist them in communicating effectively with their audience since familiarity with move schemes and awareness of flexibility in sequencing of moves offers a clear guide for authors to properly structure their academic papers.

Keywords: Interdisciplinary Field, Move Analysis, Move Sequences, Research Articles, Rhetorical Structure

Introduction

For many years, educators and researchers have been striving to enhance academic writing courses since "Writers use written texts not only to inform readers but also to direct their attention to certain aspects of the text and influence their understanding and attitude toward its content" (Malmir et al., 2019, p. 50). For this, taking notice of the nature of this genre of writing is of utmost importance and as a result, examining academic texts through a genre-based lens can elucidate their fundamental characteristics. And because in Bhatia's (1993) terms, a genre is considered as a communicative event identified through communicative purposes, knowledge about the role and sequence of the moves can be of benefit since a move carries a communicative function which in Bhatia's (1993) terms, "is always subservient to the overall communicative purpose of the genre" (p. 75).

[1] Lecturer in Applied Linguistics, Farzaneh.shadloo@yahoo.com; English Department, Ferdowsi University of Mashhad, Mashhad, Iran.

[2] Full Professor of Applied Linguistics (Corresponding Author), ghonsooly@um.ac.ir; English Department, Ferdowsi University of Mashhad, Mashhad, Iran.

[3] Full Professor of Applied Linguistics, ar.jalilifar@gmail.com; Department of English Language and Literature, Faculty of Letters and Humanities, Shahid Chamran University of Ahvaz, Ahvaz, Iran.

Thus, examining the structures of moves in research articles has always been of considerable importance since a structured writing enhances clarity and hence the impact of the study in scholarly discourse. As noted by Yearly (1981), research articles are at the forefront of scientific knowledge due to their primary role in scholarly communication. As a result, a variety of frameworks that have been developed to date aimed at identifying the distinct moves and their corresponding steps within different sections of research articles; among the most prominent are Dos Santos' (1996) five-move model applicable to abstracts, Swale's (2004) modified CARS (Create a Research Space) model relevant to introductions, Wood's (1982) framework for methodology sections, Brett's (1994) model pertaining to Results, Dudley-Evans' (1994) framework for discussions, and ultimately Ruiying and Allison's (2003) model concerning conclusion sections.

Literature Review

To date, many studies have been undertaken to examine move structures across different disciplines in different genres of academic texts. With respect to the introduction section, in one of the recent studies by Nabilla et al. (2021), analyzing research article introductions in soft and hard sciences showed that each move which was put forward by Swales' (2004) CARS model are followed by the authors and only some differences at the step level were observed. With respect to the methodology section, Peacock's (2011) study across methodology sections of 288 research articles from eight disciplines demonstrated variations between sciences and other disciplines. Aslam and Mehmood (2014) carried out an analysis of conclusion moves in 50 articles employing Ruiying and Allison (2003) and Bunton's (2005) models to examine variations in research articles from Social Sciences and Natural Sciences, and the results of their study indicated disciplinary variations in the aforementioned disciplines. All of these move-based frameworks operate under the fundamental premise that they are universally applicable across various disciplines within academic discourse (Dudley-Evans, 2000). However, researchers to date have conducted studies to see if there exist disciplinary or subdisciplinary variations in this regard (e.g. Afshar, et al., 2018; Chance, 2005; Holmes, 1997; Li, 2011; Ozturk, 2007). One of the main results of these studies is the reports of differences in conventionality and frequency of moves within different sections of research articles across different disciplines or subdisciplines. Furthermore, another aspect of genre analysis, which can elucidates genre conventions for meeting disciplinary standards, is related to how moves are combined and this concept—the move sequence—is defined as the way moves are ordered or patterned (Rungnaphawet, 2016). Even in this regard, some variations are reported across disciplines and sub-disciplines (Rungnaphawet, 2016) and it seems that there are elements such as context, audience, and writers' preference that may have an impact on the sequences of moves (Jacobson et al., 2021). Disciplinary differences were also reported by Jamalzadeh et al. (2024) in their analysis of moves and steps in MA theses by TEFL and nursing students.

To date, there has been limited discussion regarding move types and sequences within academic literature across interdisciplinary fields. In the context of this research, the term "interdisciplinary" is characterized as work that incorporates a level of integration among the involved disciplines, while each researcher maintains their own disciplinary viewpoint (Thompson & Hunston, 2020). Extensive research has been conducted on variations across disciplines, with numerous studies examining a wide array of rhetorical and linguistic elements in diverse genres (Thompson & Hunston, 2020). Nonetheless, there exists a paucity of comprehensive examination concerning the linguistic and rhetorical characteristics prevalent across various interdisciplinary fields of study, and this view is supported by Thompson and Hunston (2020) who pointed out that a considerable amount of research has been undertaken regarding the notion of interdisciplinarity; however, there exists a scarcity of corpus studies pertaining to interdisciplinary research discourses. Therefore, in this study, the introductory and concluding sections of scholarly articles were chosen for move analysis, as they constitute essential elements in the writing process. The goal was to shed light on the characteristics of scholarly papers in this particular field by examining these two significant sections.

This study set out to determine how academic papers in interdisciplinary fields align with the models that are regarded as prototypes within the fundamental generic framework of research articles. This study specifically concentrated on the following research questions:

Research Question One: What are the obligatory, optional, and conventional moves in the Introduction of Interdisciplinary academic articles?

Research Question Two: What are the obligatory, optional, and conventional moves in the Conclusion of Interdisciplinary academic articles?

Research Question Three: To what extent does the Swales's CARS model (2004) predict the sequence of move organization in the Introduction of research articles from three modes of interdisciplinarity?

Research Question Four: To what extent does the Ruiying and Allison's model (2003) predict the sequence of move organization in the Conclusion of research articles from three modes of interdisciplinarity?

Methodology

Design of the Study

Corpus The present study with its exploratory nature initiated the research by the corpus development and the initial task involved determining the appropriate interdisciplinary fields and journals to include in the study; and as a result, following a framework that assists us in an appropriate journal selection with an interdisciplinary nature was conducive. An integrative and synthesis frame of reference in a rather symmetrical form for studies of interdisciplinarity has been a common practice for years (Barry & Born, 2013); however, the model proposed by Barry and Born (2013, p. 10) was utilized, which extends beyond a mere integrative perspective by presenting "three ideal-typical arrangements of the interrelations between disciplines." Within this framework, the integrative-synthesis mode represents the initial type, while the subsequent two types are identified as the subordination-service mode and the agonistic-antagonistic mode.

Concerning their model, the *integrative-synthesis* mode combines knowledge and thought processes from two or more disciplines, merging them into a cohesive whole (Barry & Born, 2013). In the second mode which is referred to as the subordination-service mode, "one or more disciplines assume a subordinate or service role in relation to other component disciplines" (Barry & Born, 2013, p. 11). Conversely, in the agonistic-antagonistic mode, as articulated by Barry and Born (2013), interdisciplinarity emerges from "a self-conscious dialogue with, criticism of, or opposition to the boundaries of established disciplines, or the status of academic research or instrumental knowledge production" (p. 12).

Consequently, a concerted effort was undertaken to select interdisciplinary fields and the associated journals that may be categorized into one of these classifications to ensure their intrinsic interdisciplinary nature. Accordingly, the current study's corpus was composed specifically for this work and this 116,162-word corpus (the introductions: 85,453 words/ the conclusions: 30,709 words) included 90 research articles, 30 from *Climatic Change Journal* (*integrative-synthesis* mode), 30 from *Mind, Brain, & Education Journal (subordination-service* mode), and 30 from *Science & Engineering Ethics Journal (agonistic-antagonistic mode).* One criterion that we adopted was checking the statements made in the aim and scope of the journals as this section is "an indication of whether or not the journal is aimed at a broad interdisciplinary audience and also an indication of what 'interdisciplinary' is conceived to be" (Thompson & Hunston, 2020, p. 58). Moreover, all the journals selected for the present study are registered in the *Journal Citation Reports*—an exhaustive tool for indicating ranking and impact factor (IF) data of academic journals. The expert informant also helped to see if the selected journals are recommended by experts in this field and if they approve the interdisciplinary nature of the journals which is a process adopted by Gray (2015) for selecting

journals and articles. Hence, ten experts including Editors in Chief and members of the editorial board from each journal were emailed to make sure if they confirm the interdisciplinarity nature of the journal that they were asked about. Regarding *Climatic Change Journal*, five out of ten academicians responded back and they all confirmed that this journal is interdisciplinary. Concerning *Mind, Brain, & Education Journal*, two out of ten experts replied back and they both acknowledged that the journal has an interdisciplinary nature; and about *Science and Engineering Ethics Journal*, three experts responded back and they all corroborated the interdisciplinary nature of this journal. Also, all the research articles were chosen from the issues published after 2018 to be in line with Biber and Gray's (2016) statement that the more recent the research articles are published, the better the articles mirror the features of "present-day" research writing.

Analytical Frameworks

Swales' (2004) model as a prominent framework and widely used model was adopted as a frame of reference in the process of identifying moves for the introduction sections. In 1981, Swales introduced the four-move model for introductions which were as follows: *establishing the field, summarizing previous research, preparing for present research, introducing present research*. Subsequently, in response to critiques concerning the challenges associated with differentiating between Move 1 and Move 2 (Soltani et al., 2021), the CARS model, which comprises three distinct moves—namely, establishing a territory, establishing a niche, and occupying the niche—was introduced (Swales, 1990). The most recent revised version of the CARS model can be traced to Swales' (2004) research, wherein the establishment of a territory, the establishment of a niche, and presenting the present work are regarded as essential components within this framework. According to Swales' (2004) framework, Move 1 is focused on establishing the importance and relevance of the topic while also referencing relevant research conducted within that domain. Move 2 in the framework is about specifying the gap in the literature and it is in Move 3 that the authors explain about their study and its contribution to filling the knowledge gap which is outlined in Move 2. Regarding the conclusion section, the model brought forward by the framework established by Ruiying and Allison (2003) was utilized to identify the rhetorical moves. consists of three moves as *Summarizing the study*, *evaluating the study*, and *deductions from the research* and many researchers have used this framework do far (e.g. Amnuai & Wannaruk, 2013; Aslam & Mehmood, 2014; Bunton, 2005; Hilmi, Toyyibah, & Afifi, 2021; Zamani & Ebadi, 2016).

Data Analysis

Reliability Procedure

To ensure the inter-coder reliability, a training session was held for a second coder—a graduate student majored in English—to become familiar with the coding scheme. After the training was completed, an additional review session was held to evaluate the coder's performance in terms of appropriateness. Afterwards, 10 Introduction and 10 Conclusion sections were randomly coded independently by one of the present study researchers (Coder 1) and the second coder during the pilot-coding phase, and the result of the inter-coder reliability at this stage was 92.5% for the Conclusion section and 100% for the Introduction section. Making sure that a high agreement is reached regarding identifying the moves, the whole corpus was coded by the same coders and Table 1 displays the findings from the inter-coder reliability assessment. Subsequently, discrepancies and mismatches were specified and resolved through in-depth discussions. One of the challenges faced in this procedure is when a sentence appears to contain two moves; hence, in the current study, Holmes' (1997) words were followed which suggests that the sentence should be set apart for the move which is more salient.

Table 1

Inter-coder Reliability Results of the Two Sections

Introduction	**Percentage**
Climatic Change Journal	84.6 %
Mind, Brain, & Education Journal	84.9 %
Science and Engineering Ethics Journal	81.9 %
Average	**83.8 %**
Conclusion	
Climatic Change Journal	94.3 %
Mind, Brain, & Education Journal	93.1 %
Science and Engineering Ethics Journal	94.1 %
Average	**93.8 %**

For identifying moves as obligatory, conventional, and/or optional, Swales's (1990) work was followed in which a move was assigned as obligatory if it occurred with a frequency of more than 67%, and it was deemed conventional if its occurrence fell between 33% and 66% of the time, and finally a move was named as optional if it occurred less than 33%.

Results

This study employed a qualitative analysis to investigate the research questions. A primary objective of the research was to identify the moves deemed obligatory, conventional, and optional within the three interdisciplinary domains. This stood in need of a qualitative analysis of introductions (research question number 1) and conclusions (research question number 2) of the corpus.

Move Concurrences

Introduction Moves

In response to the initial research question in this study, the analysis of the corpus in this investigation demonstrated that all three moves described in Swales' (2004) CARS model were essential. This observation is consistent with the findings of Sheldon (2011) and Zand-Vakili and Kashani (2012), who similarly documented the obligatory incorporation of these three moves in the introductions they examined through the lens of Swales' (2004) framework.

Table 2

Percentage of Move Occurrence in the Introduction Sections

Moves of Introduction	**Percentage**		
	Move 1	**Move 2**	**Move 3**
Climatic Change Journal	% 96.66	% 93.33	% 100
Mind, Brain, & Education Journal	% 93.33	% 93.33	% 100
Science & Engineering Ethics Journal	% 100	% 90	% 93.33

Conclusion Moves

In relation to the second research question of the present study, the qualitative analysis of the corpus revealed that all components of the conclusion section—specifically, move 1: *Summarizing the Study*, move 2: *Evaluating the Study*, and move 3: *Deductions from the Research*—were considered obligatory across the three interdisciplinary fields, as indicated by Swales' (1990) framework. This conclusion is supported by the observation that the frequency of each move exceeded 67%.

Table 3

Percentage of Move Occurrence in the Conclusion Sections

Moves of Conclusion	Percentage		
	Move 1	Move 2	Move 3
Climatic Change Journal	% 96.66	% 80	% 80
Mind, Brain, & Education Journal	% 93.33	% 66.66	% 83.33
Science & Engineering Ethics Journal	% 93.33	% 60	% 93.33

Succinctly put, the applicability of the two models of move organization for introduction and conclusion parts in the three interdisciplinary fields under study is confirmed in the current study as all the moves proposed in these two frameworks were observed in an obligatory manner.

Patterns of Move Orders and Sequence of Moves

Introduction Section

The third research question aimed to assess whether the introductions of all research articles within the corpus adhere to a sequence analogous to the model established by Swales (2004). The findings of this study indicated that, regarding move dominance, the Introduction section exhibits a hierarchical arrangement of rhetorical moves. Specifically, Move 1 is the most prevalent, occurring 118 times, followed by Move 3 with 104 instances, and Move 2 with 99 instances, arranged in descending order of frequency (refer to Table 4).

These results correspond to those observed in earlier studies. For instance, Geng et al. (2023) found out that in both Scopus and non-Scopus journal articles, the Introduction sections followed an identical sequence: Move 1, followed by Move 3, and then Move 2. This pattern was consistent across both sets of data.

Table 4

Sequence of Moves in the Introductions of Research Articles in the Interdisciplinary Fields

	Moves Sequences		
Articles	***Science & Engineering Ethics Journal***	***Climatic Change Journal***	***Mind, Brain, & Education Journal***
Text 1	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 2	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 3	M1 M2 M3	M1 M2 M3	M1 M2 M1 M2 M3
Text 4	M1 M2 M3	M1 M3 M1 M2 M3	M1 M2 M3
Text 5	M1 M2 M3	M1 M3 M2 M3	M1 M2 M3
Text 6	M1 M2 M3 M2 M3 M1 M3 M1 M3	M1 M2 M3	M1 M2 M3
Text 7	M1 M2 M1 M2	M1 M2 M3	M1 M2 M3
Text 8	M1 M2 M3	M1 M3 M2 M3	M1 M2 M3 M2 M3
Text 9	M1 M3	M1 M2 M3	M1 M2 M1 M2 M3
Text 10	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 11	M1 M2 M3	M1 M3 M1 M3 M1 M3 M1 M3 M1 M3 M1 M3 M1	M1 M2 M3

Text 12	M1 M2 M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 13	M1 M2 M3	M1 M3	M1 M2 M3
Text 14	M1 M3	M1 M2 M3	M1 M2 M3
Text 15	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 16	M1 M2 M3	M1 M3 M1 M3 M1 M2 M3 M2 M3	M1 M2 M3
Text 17	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 18	M1 M2 M3	M1 M2 M3	M1 M3 M2 M3
Text 19	M1 M3 M2 M3	M1 M2 M3	M1 M2 M3
Text 20	M1 M2 M1 M2 M1	M1 M2 M3	M1 M3
Text 21	M1 M2 M3	M1 M2 M3	M1 M3 M1 M2 M3
Text 22	M1 M2 M3	M1 M2 M3 M2 M3	M1 M2 M1 M2 M3
Text 23	M1 M3	M1 M2 M3 M1 M2 M3	M1 M2 M3
Text 24	M1 M2 M3	M1 M2 M1 M3	M1 M2 M3
Text 25	M1 M2 M3	M1 M2 M3	M1 M2 M3
Text 26	M1 M3 M2 M3	M1 M2 M3	M1 M2 M3
Text 27	M1 M2 M3	M1 M3 M1 M3 M2 M3	M1 M2 M1 M3
Text 28	M1 M2 M1 M2 M3	M1 M2 M1 M3	M1 M3
Text 29	M1 M2 M3 M2 M3 M2 M3	M1 M2 M3	M1 M2 M3
Text 30	M1 M3 M1 M2 M3 M2 M3	M1 M2 M1 M3	M1 M2 M3 M1 M3 M2 M3

It is Move 1 which was observed in the first part of all the Introductions examined in the current study and it reoccurred in longer chains in some articles. This matter highlights the importance of the initial move as it serves as an effective way to engage with the academic community and demonstrates the significance and worth of the study to its members. (Habibi, 2008). This is consistent with what has been found in Madrunio (2012) study in which all 21 research articles written by MA and PhD students in her corpus employed Move 1. Similarly, Nabilla et al. (2021) asserted that all 10 introductions examined from both hard and soft science employed Move 1 and as a result, both disciplines agreed on the obligatory state of Move 1 in Introduction sections. Abdullah (2016) and Tessuto (2015) have also reported 100% occurrences of Move 1 in their studies.

Fronted Move 3 which is a phenomenon proposed by Swales (1990) and in which the writer starts the introduction by stating the nature, purposes, and maybe limitations of the work was not observed in the present corpus. This finding corroborates the ideas of Jalilifar (2012), who suggested that starting research articles with Move 3 is not conventional specifically in works related to the realm of ESP and/or EGP. In accordance with Swales' (2004) model, there were cases of omission (seven articles) and dislocation in this study (patterns such as M1-M3-M2-M3 in article 26 of *Science and Engineering Ethics Journal*; or M1-M3-M1-M3-M1-M2-M3-M2-M3 pattern in article 16 of *Climatic Change Journal*).

Move 2 was observed less in the introductions and this is not because the writers did not establish the niche in their work at all but because this move was not commonly observed being repeated in the cyclic sequence of moves. Similarly, Geng et al. (2023) reported that in comparison with Move 2, Move 1 and Move 3 were utilized multiple times in move sequences in the introductions of their corpora. Another reason for infrequent use of Move 2 can be due to the nature of

interdisciplinarity and this is in line with Ozturk (2007), Samraj (2002b), and Yayli and Canagarajah's (2014) statements that a discourse with interdisciplinary, new, and emergent nature can face missing M2 since identifying a niche does not seem a readily available option. In addition, Nabilla et al. (2021) referred to non-compulsory use of Move 2 in the introductions they examined in their study.

In Swales' (2004) Model, Move 3 in the introductions normally appears at the end of this section in research articles. In like manner, the majority of writers in the current corpus followed the same pattern and only less than 4 % of writers (3 out 90 cases) did not end their introduction through Move 3. And, there were only two cases (text 7 and text 20 both from *Science & Engineering Ethics Journal*) in which Move 3 was not observed at all.

Swales (1990) referred to the mandatory and strong bond that exists between Move 2 and Move 3; however, this strong relatedness is not given consideration on the part of writers in 12 out of 90 Introductions of the corpus (texts 7, 9, 14, 20, 23 from *Science & Engineering Ethics Journal*; texts 11, 28, 30 from *Climatic Change Journal*; texts 20, 27, 28 from *Mind, Brain, & Education Journal*). One explanation for this discrepancy can be due to the method of development and organization of a text by the authors. For instance, Madrunio (2012) has argued that novice writers do not follow move sequences as consistently as expert writers and how to structure the texts using moves improves by more practice. On the other hand, other factors like the generality or specificity of the subject of the study may lead to this deviation (Habibi, 2008) which can be the main reason about the organization of the introduction in some of the aforementioned articles. For example, text 14 (Kosta et al., 2009) from *Science & Engineering Ethics Journal* and text 28 (Yazar et al., 2020) from *Climatic Change Journal* can be regarded as instances of specificity as the following extracts of the articles demonstrate it:

Text 14:

[M1] *... According to Niiniluoto (1991), ''relativization is an essential or uneliminable aspect of moral judgements.'' Thus ethical values in this context are relational (Airaksinen 2003; Niiniluoto 1991, 1994). One should carefully consider the culture and the values that the users actually have before applying certain ethical principles.*

[M3]: *While our results are applied to more specific cases, especially outside Europe, one should adapt the results to those users and their values. The ethical-legal analysis described in this paper has been in connection to the development of new mobile phone based architecture for ambient intelligence applications...*

Text 28:

[M2] *... However, there is limited research on megacities with respect to the roles that key actors in such cities can play in promoting urban transitions (Pincetl et al. 2014; Hölscher et al. 2019). While research on the role of cities in low-carbon transitions is increasing (Hodson and Marvin 2010; Späth and Rohracher 2015; Kuokkanen and Yazar 2018), most of the transition literature focuses on socio-technical regimes at national level ...*

[M1] *Regime destabilization is a window of opportunity for new niches to break through to reformulate the existing urban system. It is often defined as the struggle that occurs after disruptive innovation has emerged, when the old and new regimes compete for the consolidation of rules and a new design (Kuokkanen et al. 2018). A window of opportunity refers to "an opportune moment where the time is right to introduce radical change" (Brundiers and Eakin 2018, p. 5)...*

Moreover, this variation in a set of articles in the corpus can also accord with another justification noted by Habibi (2008) which is the originality of the topic. This issue can be true especially in articles with an interdisciplinary nature since the diversity element in an interdisciplinary field brings about novelty in topics under discussion.

Conclusion Section

In addressing the fourth research question, the results of this study indicated that the M1-M2-M3 sequence was observed in 20 articles (about 32%) as shown in Table 5. In the same manner, the M1-M3 structure was found in 20 articles. And, in only 9 articles (10%), the writers of the analyzed corpus followed the M1-M2 structure. Different patterns (e.g. M1-M2-M1-M3-M2-M3/ M1-M2-M3-M2-M3/ M1-M2-M3-M2) emerged in the rest of the articles (See Table 5).

Table 5

Sequence of Moves in the Conclusion Section of Research Articles in the Interdisciplinary Field

	Moves Sequences		
Articles	***Science & Engineering Ethics Journal***	***Climatic Change Journal***	***Mind, Brain, & Education Journal***
Text 1	M1 M2 M3 M2 M3 M2 M3	M1 M2 M3 M2 M3	M1 M3
Text 2	M1 M2 M3	M1 M2 M3	M1 M3
Text 3	M2 M3 M1 M2 M3	M1 M2 M3 M2	M1 M2 M3 M2 M3 M2
Text 4	M1 M3	M1 M3 M2 M3	M3
Text 5	M1 M2 M3	M1 M2 M3	M2 M1 M3 M2 M3
Text 6	M1 M2 M3 M2	M3	M1 M3
Text 7	M1 M3	M1 M3	M1 M3
Text 8	M3	M1 M2 M1 M2 M3	M2 M3
Text 9	M1 M3	M1 M2 M3	M1 M2 M3
Text 10	M1 M3	M1 M2 M3	M1 M3
Text 11	M1 M3	M1 M2	M1 M3
Text 12	M1 M3 M1 M3	M1 M3 M2	M1 M2 M3
Text 13	M3	M1 M2 M3	M1 M2 M3
Text 14	M1 M2	M1 M2 M1 M2	M1 M2 M3
Text 15	M1 M2 M3 M2 M3 M2 M3	M1 M3	M2 M1 M3

Text 16	M1 M2	M1 M2 M3	M1 M2 M3
Text 17	M1 M3 M2 M1 M3 M2 M3 M2 M3	M1 M3 M2 M3	M1 M2
Text 18	M1 M3 M2 M3	M1 M2 M3	M1
Text 19	M2 M3 M2 M1	M1 M3	M2 M1 M3
Text 20	M1 M2 M3 M1	M1 M2	M1 M2 M3
Text 21	M1 M2 M1	M1 M2 M3	M1 M2
Text 22	M1 M2 M1 M3 M2 M3	M1 M3	M1 M2 M3
Text 23	M1 M3	M1 M2	M1 M2 M3
Text 24	M1 M2 M3	M1 M3 M2 M3	M1
Text 25	M1 M3 M1 M2 M1 M3	M1 M2	M1 M2 M1 M2 M1 M3
Text 26	M1 M3	M1 M3	M1 M3
Text 27	M1 M3 M2 M3 M1 M3	M1 M2 M1 M3	M2 M1 M2 M3 M2 M3
Text 28	M2 M3 M1 M3	M1 M3 M1 M2 M3	M2 M1 M2 M3
Text 29	M1 M3	M1 M2 M1	M1 M3 M2 M3
Text 30	M1 M3 M1 M3	M1 M2 M3	M1 M2

Moreover, in about 14 % of the articles (13 cases out of 90), Move 1 was not the first part of the Conclusion and less than 6 % of the articles (5 out of 90) in this corpus had no Move 1 and their writers started their conclusion with Move 2 or Move 3. Regarding Move 2, 25 out of 90 articles (about 27%) lacked this move and there were cases of dislocation as well. Text 19 (Murphy et al., 2010) in *Science and Engineering Journal* with the pattern of M2-M3-M2-M1 is one example for this case:

[M2]: *Risk and uncertainty, especially uncertainty inherent to engineering modeling, are a central part of engineering work. Modeling is important in both engineering and science, and the uncertainties associated with modeling give rise to important issues and problems in both disciplines.* ***[M3]:*** *Even if scientific realism is not embraced, scientific work must, at a minimum, produce an understanding of nature that allows for accurate explanation and prediction of natural phenomena. Modeling can contribute to this goal, and epistemic uncertainties inherent in modeling must be eliminated, if possible.* ***[M2]:*** *In engineering, the goal is not the explanation and prediction of natural phenomena, but the creation of artifacts and technology, and again modeling is important. We have offered a classification of the types of uncertainty in developing, applying and interpreting models*

generally and discussed some of the differences between science and engineering, emphasizing the various constraints on engineering work, many of which have a value dimension. ***[M1]:*** *Finally, we have considered some of the special problems associated with uncertainty in engineering modeling and suggested nine guidelines for dealing with such uncertainty. These guidelines are developed based on the central goal of engineering and the nature of different types of uncertainties in modeling.*

In the Conclusion section, Move 3 was found to follow Move 1 in 32% of the analyzed articles, specifically in 29 out of 90 cases. And, Move 3 occupied the whole Conclusion in four articles. Note the following extract from article number 4 (Sutter et al., 2018) in the corpus from *Mind, Brain, and Education Journal* in which the conclusion is devoted to Move 3:

[M3]: *The findings presented here indicate that further research on the physiological impact obesity may have in development during early childhood is warranted. In particular, a better understanding of associations between obesity, physiology, and school readiness is needed in order to provide effective prevention and intervention efforts while these associations are still developing. Noted associations between obesity, biomarkers, and school readiness have potential implications for nutrition practitioners as well as professionals in early childhood education, suggesting that preventing or reducing obesity may have long-term benefits not just for health but also for academic outcomes. Additionally, outreach efforts that focus on promoting skills implicated in school readiness, such as inhibitory control, in children with early childhood obesity may improve school outcomes given that underlying physiological differences associated with obesity could create barriers to their learning.*

Furthermore, 14 out of 90 papers did not employ Move 3. Likewise, in the study by Madrunio (2012), in which the sequences of moves in the introductory and concluding sections of 21 graduate papers (10 by MA students and 11 by PhD students) were examined, the study found that among all PhD papers examined, only one lacked Move 3 (Deductions from the research). Considering the size of the corpus, this finding shows a level of consistency with the present study regarding Move 3. All in all, these results differ from Ruiying and Allison's (2003) findings of high linearity in the structure of conclusion moves, but they are broadly consistent with other works such as Moritz et al. (2008) and Loi et al. (2016) in which cyclicality and complexity in the structure of conclusion moves are reported. Also, there are studies in which the moves of conclusion are examined using different frameworks and the issue of the cyclical structure of moves is also pointed out. For example, according to Sheldon (2018), the conclusion section typically comprises three key components: *consolidation of results*, *limitations of the study*, and *further research suggested* occurred in a cyclical manner rather than linear in scholarly articles authored by writers in English and Spanish languages. Another example can be Bunton's (2005) work in which the cyclical nature of the rhetorical structure of PhD conclusion chapters across different disciplines was shown. The non-linear structure of conclusion sections in this research might be attributed to the unique rhetorical requirements of interdisciplinary studies. Since interdisciplinary fields call for more complexity and flexibility (Daniel et al., 2022), cyclicality rather than linearity in the structure of moves is more likely to meet the requirements of academic writing in this field as in the words of Bunton (2005), cyclical progression leads to a more complex and flexible rhetorical structure in conclusion sections.

Discussion and Conclusion

The objective of the current study was to examine the type and sequence of rhetorical moves in research articles characterized by an interdisciplinary nature. Addressing the inquiries raised at the outset of this research, we can now conclude that the two frameworks employed in this study—Swales' (2004) Model and Ruiying and Allison's (2003) Model—may be considered "pattern-seeking" as described by Habibi (2008). This characterization aligns with Habibi's previous assessment of Swales' CARS Model. Therefore, the importance of considering "flexibility as an integral part to account for those discoursal functions and aspects of the genre that are more free-standing and unstable in their position" (Habibi, 2008, p. 110) cannot be neglected. Therefore, in scholarly articles across interdisciplinary fields, following the proposed schematic structures based on these two frameworks prove useful specifically for students entering interdisciplinary fields and wish to publish their work. And in general, the authors in the corpus analyzed in the current study adhered to established conventions of an academic written text. From pedagogical perspective, these results suggest that genre-based instruction, in which the analysis of the moves and their sequences are taken into account, can provide practical and valuable guidance for students since they can learn how to effectively navigate conventions set by the discourse community. And in Madrunio's (2012) terms, within the realm of possibilities that exists, student-writers can find the reasons behind employing or not employing certain moves in the process of writing. Similar to Rungnaphawet's (2016) observation that adherence to conventional move sequences is decreasing in the abstracts of research articles he studied, a comparable shift appears to be occurring in other sections of research papers and it can be in students-writers' best interest to be aware of the degree of flexibility involved the process of writing research articles in terms of move sequences.

However, the findings should be viewed with caution as more research on this topic based on larger corpora needs to be conducted. For further studies, it is also suggested that researchers take the analysis of the steps into account in order to improve the level of accuracy on this topic. Moreover, the current study only analyzed the introductions and conclusions of the research articles so it would be useful if future studies examine other sections of articles across interdisciplinary fields.

Acknowledgement

We are deeply grateful to all those who helped us undertake this research.

Declaration of Conflicting Interests

We declare that we do not have any conflicts of interest to declare.

Funding Details

This research did not receive any funding from any agency.

References

Abdullah, S. (2016). An analysis of cross-discipline research article introduction structures through a modified Create- A-Research-Space (CARS) model. *EFL Journal*, *1*(1), 1–16. https://doi.org/http://dx.doi.org/10.21462/eflj.v1i1.1

Afshar, H. S., Doosti, M., & Movassagh, H. (2018). A Genre Analysis of the Introduction Section of Applied Linguistics and Chemistry Research Articles. *Applied Linguistics*, *21*(1), 163-214. https://ijal.khu.ac.ir/article-1-2856-fa.html

Amnuai, W., & Wannaruk, A. (2013). A Move-Based Analysis of the Conclusion Sections of Research Article Published in International and Thai Journals. *3L: Language, Linguistics, Literature*®, *19*(2), 53-63. http://journalarticle.ukm.my/6519/

Aslam, I., & Mehmood, A. (2014). Genre Analysis of Conclusion Sections of Pakistani Research Articles in Natural and Social Sciences. *Journal of Natural Sciences Research*, *4*(22), 106–112. https://iiste.org/Journals/index.php/JNSR/article/view/17634/17636

Benraiss Khalid, & Bani koumachi. (2023). Rhetorical Moves in Applied Language Research Article Introductions of Moroccan L2 writers of English: A Generic Move Analysis. *Eastern Journal of Languages, Linguistics and Literatures*, *4*(3), 1-13. https://qabasjournals.com/index.php/ejlll/article/view/216

Brett, P. (1994). A genre analysis of the results section of sociology articles. *English for Specific Purposes*, *13*(1), 47–59. https://doi.org/10.1016/0889-4906(94)90024-8

Bunton, D. (2005). The structure of Ph.D. conclusion chapters. *Journal of English for Academic Purposes, 4*(3), 207-224. https://doi.org/10.1016/j.jeap.2005.03.004

Chance, P. B. (2005). An interdisciplinary comparison of master's thesis abstracts. Theses Digitization Project. 2794. https://scholarworks.lib.csusb.edu/etd-project/2794

Daniel, K. L., McConnell, M., Schuchardt, A., & Peffer, M. E. (2022). Challenges facing interdisciplinary researchers: Findings from a professional development workshop. *PloS One*, *17*(4), e0267234. https://doi.org/10.1371/journal.pone.0267234

Dudley-Evans, T. (1994). Genre analysis: An approach to text analysis for ESP. In M.Coulthard (Ed.), Advances in written text analysis (pp. 219-228). London: Routledge.

Dudley-Evans, T. (2000). Genre analysis: a key to a theory of ESP? *Ibérica*, *2*, 3–11. https://dialnet.unirioja.es/descarga/articulo/2475568.pdf

Geng, H., Lee, G. I., Jalaluddin, I., & Tan, H. (2023). Occurrence Frequency of Rhetorical Moves in Introductions of Linguistics Research Articles From Non-Scopus and Scopus Journals. *Journal of Language Teaching and Research*, *14*(5), 1279-1289. https://doi.org/10.17507/jltr.1405.16

Habibi, P. (2008). Genre Analysis of Research Article Introductions across ESP, Psycholinguistics, and Sociolinguistics. *Iranian Journal of Applied Linguistics (IJAL), 11*(2), 87-114. https://ijal.khu.ac.ir/article-1-67-en.html

Hilmi, A. Z., & Afifi, N. (2021). A genre analysis on the discussion section of quantitative and qualitative research articles in ELT and linguistics. *JEELS (Journal of English Education and Linguistics Studies)*, *8*(2), 341-369. https://doi.org/10.30762/jeels.v8i2.3264

Holmes, R. (1997). Genre analysis and the social sciences: An investigation of the structure of research article discussion sections in three disciplines. *English for Specific Purposes*, *16*(4), 321–337. https://doi.org/10.1016/S0889-4906(96)00038

Jacobson, B., Pawlowski, M., & Tardy, C. (2021). Make your "move": Writing in genres. *Writing Spaces: Readings on Writing, 4*, 217-238. https://writingspaces.org/make-your-move-writing-in-genres/

Jalilifar, A. R. (2012). Research Article Introductions: Sub-disciplinary Variations in Applied Linguistics. *Teaching English as a Second Language Quarterly (Formerly Journal of Teaching Language Skills)*, *29*(2), 29-55. https://doi.org/10.22099/jtls.2012.407

Jamalzadeh Jahromi, M., Hadipour, E. & Akbarpour, L. (2024). A Genre Analysis of Rhetorical Moves in MA Theses Written by Students of TEFL and Nursing (Research Paper). *Iranian Journal of English for Academic Purposes*, *12*(4), 73-88. https://www.magiran.com/paper/2707061

Flowerdew, J. (2006). Use of signalling nouns in a learner corpus. *International Journal of Corpus Linguistics*, *11*(3), 345-362. https://doi.org/10.1075/ijcl.11.3.07flo

Kosta, E., Pitkänen, O., Niemelä, M., & Kaasinen, E. (2009). Mobile-Centric Ambient Intelligence in Health- and Homecare—Anticipating Ethical and Legal Challenges. *Science and Engineering Ethics*, *16*(2), 303–323. https://doi.org/10.1007/s11948-009-9150-5

Li, Y. (2011). Li, Y. (2011). *A genre analysis of English and Chinese research article abstracts in linguistics and chemistry*. http://scholarworks.calstate.edu/handle/10211.10/1128

Loi, C. K., Lim, J. M. H., & Wharton, S. (2016). Expressing an evaluative stance in English and Malay research article conclusions: International publications versus local publications. *Journal of English for Academic Purposes*, *21*, 1–16. https://doi.org/10.1016/j.jeap.2015.08.004

Madrunio, M. R. (2012). Move Sequences in Graduate Research Paper Introductions and Conclusions. *i-Manager's Journal on English Language Teaching/I-manager's Journal on English Language Teaching*, *2*(1), 1–14. https://doi.org/10.26634/jelt.2.1.1615

Malmir, B., Khany, R. & Aliakbari, M. (2019). Journal Article Highlights in Applied Linguistics: An Exploration into the Rhetorical Moves and their Lexico-grammatical Features (Research Paper). *Iranian Journal of English for Academic Purposes*, *8*(4), 49-63. https://journalscmu.sinaweb.net/article_96017.html

Moritz, M. W., Meurer, J. L., & Dellagnelo, A. (2008). Conclusions as components of research articles across Portuguese as a native language, English as a native language and English as a foreign language: A contrastive genre study. *The Specialist, 29*(2), 233-253. https://doaj.org/article/3b228e357cd84b7b9bd67889f2327b9f

Murphy, C., Gardoni, P., & Harris, C. E. (2010). Classification and moral evaluation of uncertainties in engineering modeling. *Science and Engineering Ethics*, *17*(3), 553–570. https://doi.org/10.1007/s11948-010-9242-2

Nabilla, S., Kurniawan, E., & Gunawan, W. (2021). Rhetorical move structure of soft and hard science research article introductions by novice Indonesian authors. *Bahasa Dan Seni: Jurnal Bahasa, Sastra, Seni, Dan Pengajarannya*, *49*(2), 135–151. https://doi.org/10.17977/um015v49i22021p135

Nabilla, S., Luthfianda, S. N., Suherdi, D., Kurniawan, E., Gunawan, W., & Lubis, A. H. (2021). How Do Novice and Experienced Indonesian Authors Rhetorically Organize Research Article Introduction? *Advances in Social Science, Education and Humanities Research/Advances in Social Science, Education and Humanities Research*, *546*, 502-507. https://doi.org/10.2991/assehr.k.210427.076

Ozturk, I. (2007). The textual organisation of research article introductions in applied linguistics: Variability within a single discipline. *English for Specific Purposes*, *26*(1), 25–38. https://doi.org/10.1016/j.esp.2005.12.003

Ruiying, Y., & Allison, D. (2003). Research articles in applied linguistics: Moving from results to conclusions. *English for specific purposes*, *22*(4), 365-385. https://doi.org/10.1016/s0889-4906(02)00026-1

Rungnaphawet, R. (2016). Moves, move sequences, and move cycling in computer engineering and electrical engineering research article abstracts. *PASAA PARITAT JOURNAL*, *31*, 107–140. http://www.culi.chula.ac.th/publicationsonline/files/article2/fg3ibWxqNsThu24112.pdf

Samraj, B. (2002b). Introductions in research articles: variations across disciplines. *English for Specific Purposes*, *21*(1), 1–17. https://doi.org/10.1016/s0889-4906(00)00023-5

Santos, M. B. D. (1996). The textual organization of research paper abstracts in applied linguistics. *Text - Interdisciplinary Journal for the Study of Discourse*, *16*(4). https://doi.org/10.1515/text.1.1996.16.4.481

Sheldon, E. (2018). Dialogic spaces of knowledge construction in research article Conclusion sections written by English L1, English L2 and Spanish L1 writers. *Ibérica*, (35), 13–40. Retrieved from https://revistaiberica.org/index.php/iberica/article/view/133

Soltani, K., Kuhi, D., & Hadidi Tamjid, N. (2021). Move Recycling in Soft Science Research Articles: English Native Speakers vs. Iranian Speakers. *Journal of Language Horizons*, *5*(2), 115-137. https://doi.org/10.22051/lghor.2021.33356.1376

Sutter, C., Ontai, L. L., Shilts, M. K., Lanoue, L., Allen, L. H., & Townsend, M. S. (2018). Associations Between School Readiness and Obesity- and Inflammation-Related Biomarkers in Low-Income Preschoolers Within the Healthy Kids Study. *Mind Brain and Education*, *12*(1), 28–38. https://doi.org/10.1111/mbe.12165

Swales, J. M. (1981). *Aspects of article introductions in ESP research reports.* University of Michigan Press. https://doi.org/10.3998/mpub.3985899.

Swales, J. M. (1990). Genre Analysis: English in Academic and Research Settings. Cambridge: Cambridge University Press. https://www.cambridge.org/core/books/genre-analysis/6B7C6A44D0DA93E9E46F7A2962B0CB0D

Swales, J. M. (2004). *Research genres: Explorations and applications*. Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9781139524

Tessuto, G. (2015). Generic structure and rhetorical moves in English-language empirical law research articles: Sites of interdisciplinary and interdiscursive cross-over. *English for Specific Purposes*, *37*(1), 13–26. https://doi.org/10.1016/j.esp.2014.06.002

Thompson, P., & Hunston, S. (2020). *Interdisciplinary Research Discourse: Corpus Investigations into Environment Journals*. Routledge. https://doi.org/10.4324/9781003009344

Yayli, D., & Canagarajah, A. S. (2014). A missing move and an emergent step: Variation in the RA introductions of two composition journals. *The Reading Matrix*, *14*(1), 297-313. https://www.readingmatrix.com/files/1-81670md8.pdf

Yazar, M., Hestad, D., Mangalagiu, D., Ma, Y., Thornton, T. F., Saysel, A. K., & Zhu, D. (2020). Enabling environments for regime destabilization towards sustainable urban transitions in megacities: comparing Shanghai and Istanbul. *Climatic Change*, *160*(4), 727–752. https://doi.org/10.1007/s10584-020-02726-1

Yearley, S. (1981). Textual Persuasion: The role of social accounting in the construction of scientific arguments. *Philosophy of the Social Sciences*, *11*(3), 409-435. https://doi.org/10.1177/004839318101100307

Zamani, G., & Ebadi, S. (2016). Move analysis of the conclusion sections of research papers in Persian and English. *Cypriot Journal of Educational Sciences*, *11*(1), 9-20. http://files.eric.ed.gov/fulltext/EJ1140659.pdf