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The Impact of Discipline-Specific Variation in English on Shaping Iranian ESP Writers' Schematic Borders in their Expertise: A Move Analysis Study of Disciplinary Research Articles 'Conclusions'

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Abstract
Having active participation in today's more universally-networked research community through publishing in valid English journals has become delicate for the most populated contemporary users of English as a foreign language known as 'ESP writers. This challenge is typically experienced in ESP authors' variation in employing the generic move patterns in the overall structure of the academic research articles (RAs) 'Conclusions' sections, probably caused by heterogeneity in 'English' across the authors' discipline-specific fields of expertise. Thus, the purpose of the present study was to analyze the organizational moves/steps of the RAs 'conclusions' to examine any significant difference/s in the discipline-specific authors' writing styles in terms of the 'type' and 'frequency' of the moves/steps under study. To this end, 160 randomly selected RAs conclusions (RACs) from eight academic disciplines equally representing the hard sciences and soft sciences, were comparatively analyzed based on a conflated ESP move analysis model of Yang and Allison (2003), and Moritz, Meurer and Dellagnelo (2008). The results of the study obtained from the Frequency counts, Chi-square tests and the Effect Size measure revealed statistically significant differences between the frequency of moves/steps of the RACs in both discipline-specific groups of sciences; in addition, it was found that generic move patterns of the RACs did not strictly follow the proposed model. However, Pedagogical and practical implications along with suggestions for further studies are presented.

***Keywords*:** Academic writing, Discipline-specific variation, Hard sciences, Moves/steps, RAs Conclusions, Soft sciences

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INTRODUCTION

Nowadays, having a good mastery of a foreign language is considered as a principal part in the pedagogy at all levels of education. According to Horner (2017), the English language, as it has been successfully established and internationally recognized as a lingua franca since the commencement of the new millennium, is now the most prevalent and official language of science, research, technology, business, and cross-border communications (Seidlhofer & Widdowson, 2020) among people of most countries in the world.

Over the last five decades, the imperative need for the proficiency in English for academic and scientific communications in both educational and professional settings has heralded a surging development of English for Specific Purposes (ESP) (Ruiz, Palmer, & Fortanet, 2010). Similarly, Dudley-Evans and Johns (1998) have argued that since the emergence of English for specific purposes (ESP) as a global movement in the mid-1960s, there has been a great emphasis on helping international non-English speaking students, as ESP writers, in English-medium universities to efficiently write their academic research articles in English.

However, closely paired with the flourishing EAP movement, and more specifically English for Research Publication Purposes (ERPP) (Flowerdew & Habibie, 2022) is the highly significant concept of 'written academic discourse'. In this regard, Hyland (2014) has stated that academic texts play a key role in the establishment and enhancement of social relations among the members of discourse community, typically characterized by the important aspects of 'organization and persuasion' to meet the needs and expectations of their specific audiences.

Likewise, Flowerdew (2015) believes that 'academic writing' is the main way of communicating the scholarship locally and internationally through the employment of such independent genres as lectures, research articles, and textbooks among which the 'Research Articles' (henceforth, RAs) are preeminent, arousing the discipline-specific ESP scholars' interest and attention to conducting the genre-oriented studies on the RAs' conventional sections (Rowley-Jolivet, 2017) almost in the last two decades.

An inalienable sub-genre within the overall structure of the academic RAs is the '*Conclusion section'* that not only contains a summary of the whole study but also such other essential elements as pedagogical

implications, applications, and recommendations; further, it requires more of the authors to have careful restatement of the research topic along with personal subjectivity and innovation (Sandoval, 2010). Notwithstanding the abundant research on otherconventional sections of the academic RAs, studies on structural analysis of the RA conclusions (RACs), as one of the most fundamental parts of an article, have already been rarely examined, and are still under-researched and need further investigations.

Therefore, motivated by the pedagogical usefulness of ESP move analysis as a powerful approach to analyzing the texts to probe the issue of why discipline-specific English acquires certain specifications, the present study intends to investigate the macro-structural aspects of the academic RACs, across the two discipline-specific groups of the academic hard sciences and soft sciences in order to shed more light on how variation in English used by the discipline-specific communities (Hyon, 2017) brings about schematic borders in ESP writers' thinking and ideology and, accordingly, their rhetorical flexibility and writing style within their specific academic domains of expertise.

However, exploring the virtues of such variation/s across disciplinary discourses (Hyland, 2023), could be an influential way of raising the awareness of both professionals of ESP writing instruction programs, and especially authors of the academic RACs across different discipline-specific areas to have analytical engagement with and gain fuller understanding of writing in English within disciplinary areas of study.

LITERATURE REVIEW

There has been an enormous interest in genres as theoretical and highly structured classes within communities of practice and the theory of genre analysis over the last few decades on the part of scholars and applied linguists from such diverse areas as rhetoric, linguistics and especially academic writing in an attempt to characterize this very significant notion.

Drawing on the plethora and proliferation of varieties in both the written and spoken forms of language created daily by language users in various academic and professional contexts with always-changing tools of cross-border communication (Shokouhi & Kamyab, 2004, p. 159), genre analysis has primarily focused on different text-types in terms of their specifications of the target audiences, structural regularities, purpose and

diction in the discourse communities that apply them. In other words, it has placed the purposive use of language in social contexts at the center instead of describing linguistic aspects at the surface level in isolation (Bhatia, 1993).

In the present research, as far as the concept of genre analysis within the conceptual framework of ESP approach is concerned, the focus of attention is on the 'context-embedded', purposeful, and socio-cognitive view of genre (Johns, 2008, p. 4), initially conceptualized within the UK and originally developed following Swales' (1981) groundbreaking seminal work, '*Create a Research Space*' (CARS) model, on analyzing the underlying generic structure of the academic RAs Introduction Section.

However, Swales' (1990) working definition of *genre* as being comprised of five key principles: "a class of communicative events; shared communicative purposes; discourse community; variations in generic patterns; and the rationale behind genre", inspired by the need to raise the non-native English writers' consciousness of the inter-discursive practice of various text-types in general and of generic organization of the academic RAs across the diverse disciplines in particular, has given an illuminating sketch on ESP scholars' fuller understanding of the move analysis in the current literature.

ESP Move Analysis

Concerning study of the rhetorical structure of the academic RAs based on ESP tradition of genre analysis, Swales (1981; 1990) was the most prominent and 'first' to employ the '*rhetorical move analysis*' to discover how the generic components are structurally organized in the academic RAs Introductions. According to Swales' (2004) widely-cited definition, a '*move'* is a unit of rhetoric and discourse by which a meaningful communicative function is fulfilled in a well-structured text in the written or spoken form of language (p. 228). Similarly, move denotes a rhetorical construct of varying length whose communicative purpose typically gets realized through one or several sub-moves or steps (Swales, 1990, p. 141). In much the same vein, Ding (2007) has, from ESP standpoint, described the *move* as a unit which carries a function or purpose in a particular genre-text in close relation to the whole intended purpose of the text; in addition, a

move helps recognize the inherent norms in specific genres across written discourse (pp. 369-370).

Move analysis, as primarily grounded in Swales' (1990, p. 141) theory of genre research and pedagogy, is viewed as a well-known top-down approach in ESP text-based study and analysis of the diverse academic genre texts (Hyon, 2018, p. 30), emphasizing the overarching communicative purposes accomplished by the constituent macro-structural elements; that is, the rhetorical moves and sub-moves (steps) (Moreno & Swales, 2018).

Each move is normally comprised of one or some '*sub-moves*', very often used interchangeably as '*steps'*, which are taken into account as small units interwoven in a unified text at the lower hierarchy than a constituent move which may add detailed features and help the way ideas are set forth in a rhetorical move by the writer (Dudley-Evans & St. John, 1998, p. 89). Likewise, it is believed that such 'rhetorical strategies' or steps consist of multiple text segments that conflate in order to realize a particular move helping it fulfill the communicative function the move is supposed to achieve (Biber, Connor, & Upton, 2007, p. 24).

However, the main purpose of the application of move analysis process in this study is to recognize how ESP authors' strategic choices of the linguistic resources characterize the constituent moves and move constellations in the overall body of the RACs across diverse disciplinary territories.

Discipline-Specific Variations in Written English Discourse

As argued by Widdowson (1979), the comprehensive term of 'universal scientific discourse' refers to a globally recognized channel of communication through which the new facts, ideas, knowledge and information are transmitted to members of the academic discourse communities all over the world in both spoken and written modes of English. However, contained within the general heading of academic discourse is the most widely used communicative tool for the exchange of 'scientific discourse' among the academics and scholars, typically termed as 'written academic discourse' (Hyland, 2015), encompassing such scientific products as university textbooks, dissertations, theses and especially

research articles (RAs), each characterized by its own specific style, norms and conventions of writing.

In this regard, ESP scholars involved in the study of genre specifications have depicted a '*schematic boundary*' or a 'disciplinary division line' between the disciplinary fields of study based on distinction between the academic 'hard sciences and soft sciences', which indicates their degree of *hardness*, claiming that writers in the cross-disciplinary territories follow their own specific generic norms and conventions in the writing of the academic RAs conventional sections. Associated with the idea of discipline-specific variations, Hyland (2006) has proposed a multi-dimensional disciplinary 'boundary line' of the academic knowledge with regard to such criteria as discourse type, research method, discourse fluidity, readership and so on.

In this study, as far as the disciplinary division within the academic 'hard sciences and soft sciences' is concerned, it has been argued that such a schematic distinction between the disciplinary areas helps scholars understand a multi-dimensional 'variation' in an academic community", maintaining that any variation in the construction of knowledge can probably result in a variation in how this knowledge is reported in the written form of discourse (Hyland, 2008). As an example in this regard, Dudley-Evans (2000) has put forward that the way generic move patterns are utilized by the discipline-specific authors is not something 'universal' in that some structural moves or sub-moves (steps) can be added to or omitted by ESP writers for the intended purposes to be achieved as appropriately as possible (Caplan, 2019).

However, previous research on the nature of discipline-specific discursive variation/s in ESP academic writing within the multiple domains gives the current study a solid foundation to investigate the macro-structural components of the RACs across the academic hard sciences and soft sciences from ESP move analysis perspective.

Related Studies on the RAs Conventional Sections

Over the years, notable examples of ESP move analysis studies on the academic RAs conventional sections have been conducted across the diverse disciplines and cultures that can be mentioned as follows: Abstract section (Hyland, 2000; Samaraj, 2005; Behnam and Zamanian, 2014; Hossein

Gholipour & Saeedi, 2019; Kumar et al., 2023), Introductions section (Swales, 1990; Bhatia, 1993; Lim, 2012; Nodoushan & Khakbaz, 2011; Samraj, 2008), Titles (Haggan, 2004; Jalilifar, 2010), Review of Literature section (Saadaadi Motlagh & Karam Pourchangi, 2019), M**e**thod section (Bruce, 2008; Peacock, 2011; Cotos et al., 2017), Results and Discussion section (Atai & Falah, 2005; Lim, 2010; Williams, 1999; Thompson 1993), and Discussion section (Holmes,1997; Lim, 2008; Basturkmen, 2012; Le & Harrington, 2015; Kuhi & Soltani, 2022).

However, it is worth mentioning that unlike other conventionally recognized sections of the academic RAs, the 'conclusion sections' have ever been rarely investigated during the last two decades. In this regard, one main reason for this paucity is that some genre scholars, the most prominent of whom Swales (1990), did not believe in the recognition of the RACs as independent parts distinct from the '*discussion* section', claiming that the 'results and discussion' parts are considered as merged entities, and that 'conclusions, implications or applications' are regarded as additional and substituted sections. Thus, he has proposed no model for the rhetorical move analysis of this so-called *final* part of the RAs (p. 170). In line with this view, Posteguillo (1999) has stated that the RAC is typically viewed as a part conflated with the 'discussion' section.

Conversely, as argued by Weissberg and Buker (1990), the 'discussion and conclusion' parts are taken into account as *separate* sections, and this *concluding* part of the RAs is "usually titled discussion (but) sometimes is called conclusion" stating that each of these two sections serves its own specific communicative purpose which makes them conceptually 'independent'. In addition, it is believed that the 'conclusion' section is concerned with emphasizing the value of such results and describes the way findings contribute to the research domain whereas the 'discussion' section theoretically deals with how research results are interpreted (p. 161).

Having recognized the RAs '*conclusion'* part as a genre distinct from the other conventional sections, Morales (2012) has mentioned that the 'conclusion section' represents a clear sketch of the whole research along with practical implications, and recommendations for further studies. However, the previous related studies conducted both locally and universally are reviewed and explained below, noting that the present

research will only focus on those studies with independent discussion and conclusion sections.

Foreign Studies on RAs Conclusion Sections

One of the most influential ESP move analysis studies on the RACs is that of Yang and Allison (2003) which has ever made a major breakthrough in the development of other similar investigations due to its highly effective and applicable model of analyzing the constituent moves/steps of the RACs. In their study on the RACs related to the academic discipline of applied linguistics, Yang and Allison (2003) argued that the conclusion parts in RAs are composed of the three *linearly structured* constituent moves as follows: Move 1: *Summarizing the study*; Move 2: *Evaluating the study*, during which the researcher evaluates the study within these three corresponding Steps as follows: Step 1: *Indicating significance/advantage*; Step 2: *Indicating limitations;* and Step 3: *Evaluating methodology*. Based on Yang and Allison's (2003) intra-disciplinary study on the RACs, Move 3: *Deductions from the research*, is itself comprised of the two organizing steps as follows. Step 1: *Recommending further Research*; and Step 2: *Drawing pedagogic implications* (p. 382-383).

A relevant ESP move analysis study carried out by Aslam and Mehmood (2014) attempted to probe the macro-structural (moves/steps) analysis of the generic organization of the RACs across the academic fields of natural sciences and social sciences with the aim of discovering how differently authors in the two different groups of sciences employ the constituent moves in the structure of RACs. The research results obtained from their application of Yang and Allison (2013), and Bunton's (2005) models revealed that there existed discipline-specific variations in the RACs in both disciplinary fields.

Iranian Move Analysis Studies on the RAs Conclusions

A previous study closely relevant to the present research has been accomplished by Jahangard, Rajabi, and Khalaji (2014) in which they probed the structural organization of the constituent moves/steps of forty RAs Conclusion and Implication sections taken from valid journals, and written by both native and non-native English writers across the two diverse academic disciplines of mechanical engineering and applied linguistics.

For the purpose of move analysis of the RAs conclusions and implications under investigation, Jahangard et al. (2014) applied the model of genre analysis proposed by Dudley-Evans (1994). The research findings reported 'significant discrepancies' between the organizing moves utilized in the RACs in the two mentioned disciplinary fields. In addition, they found a shortcoming of Dudley Evans's (1994) model of the structural move analysis.

Another move analysis study on the academic RACs was carried out by Zamani and Ebadi (2016) in which they have examined the macro-structural organization of the conclusion parts related to both English and Persian RAs published in international journals across the two academic disciplines of applied linguistics and civil engineering, employing Yang and Allison's (2003) move analysis model. However, slight differences between the cross-disciplinary moves employed in the conclusions were explored via the frequency analysis of the moves/steps applied in the RACs across the two fields under investigation.

However, with respect to the perceived gap in the related literature and paucity of the move analysis studies on this sub-genre especially in the Iranian EFL context, as clearly observed through undertaking a review of the relevant work, there is still a need to conduct an ESP text-based genre analysis research on the macro-structural components; that is, the organizational moves/steps employed in the body of the RACs across the discipline-specific areas from the academic hard sciences and soft sciences to examine any probable generic variations and their impact on the local ESP authors' schematic boundaries in the rhetorical style of their discipline-specific RACs under research.

PURPOSE OF THE STUDY

This study was intended to apply ESP 'move analysis approach' as the most appropriate and practical text-based research method (Tardy & Gevers, 2024), for analyzing the academic RACs written in English by Iranian ESP authors across discipline-specific fields within the academic hard sciences and soft sciences. The purpose of the present research is two-fold: Firstly, to investigate the prototypical generic move patterns of the 'conclusions' of the cross-disciplinary RAs, applying Yang and Allison's (2003) model in combination with a 'Step' taken from Moritz, Meurer and Dellagnelo's

(2008) model of the RACs move analysis; Secondly, to draw a comparison between the results in both discipline-specific groups of sciences from the academic hard sciences and soft sciences, respectively.

However, the rationale behind such a purpose is to explore the probable impact of variation in the discipline-specific English on the creation of schematic boundaries in ESP writers' rhetorical style and move application, with respect to the 'type and frequency' of the generic moves in the body of the RACs related to their specific domains of academic expertise. Therefore, the aim of the current research is to answer the following research questions:

1. What are the organizational moves/steps in the RACs across the discipline-specific fields within the academic hard sciences and soft sciences?
2. Are there any significant differences between the generic moves/steps in the RACs across the discipline-specific fields with respect to the '*frequency* of *occurrence'* of the moves?

METHOD

Corpus Selection

To achieve the purpose of the present discipline-specific ESP move analysis study of the RACs, a *two-part* corpus comprised of a total number of 160 'conclusion sections' were extracted from the academic RAs, recognized as 'original articles' containing the conventional 'Introduction, Method, Results, Discussion and Conclusion' sections. The RAs were of high quality of the content and writing style, written in English by the post-graduate Iranian ESP writers who have previously passed their own specialized ESP courses, and published in valid peer-reviewed ISI journals.

The researchers tried to randomly select those *full-text* RAs out of a wider pool through the 'Web of Science' as one of the most comprehensive platforms providing multiple databases concerning the scientific journals from different academic disciplines, and also from the 'Scientific International Database' (SID), a local source of the most current academic journals in Iran. The RAs are also characterized by having an average length between 5000 to 9000 words, and a *temporal scope* of publication from 2014 to 2022 so as to ensure the consistency and control change/s in the results of the study because of the *time* factor. Most importantly, to improve

the external and internal validity of the samples' content, the researchers selected the required RAs considering the Nwogu's (1997) triple conditions for the academic RAs to be as 'reputable, representative, and accessible' (online) as possible; further, the emphasis was only on those RAs with recognized conventional sections in general and those with separately identified 'conclusion section' in particular.

However, the overall 160 RACs were divided into two 80-RA sets to equally represent the two pre-specified discipline-specific domains across the academic *hard* sciences (Metallurgic Engineering, Civil Engineering, Physics, and Electric Engineering, each having 20 RACs), and the soft sciences group (Economy, Sociology, Management and Psychology, with 20 RACs for each sub-discipline).

Instrumentation

To scrutinize the discipline-specific RAC part genres in the present ESP move analysis study, the researchers applied Yang and Allison's (2003) framework to the analysis of the organizational 'moves/steps' under research. The motive for the selection of Yang and Allison's model of rhetorical move analysis was that it had been widely utilized in ESP move analysis studies on the academic RACs almost over the last two decades. It has also been a rich source of insight and inspiration to ESP practitioners, genre scholars and especially disciplinary ESP authors in their genre-based investigations.

However, to improve this model, as recommended by some researchers in the related literature, a change was brought about into Yang and Allison's (2003) model through '*adding'* the Step C (*Making reference to previous research*) from Move 6 (*Making deductions from the research*), adopted from Moritz, Meurer and Dellagnelo's (2008) move analysis model of the RACs. Thus, Table (1) below illustrates the combination of Yang and Allison's (2003) model with the mentioned slight 'modification' marked by an asterisk sign (*), as the *first* Step of the corresponding Move 3, written in italics:

Table 1: Yang & Allison (2003) and Moritz, Meurer & Dellagnelo's (2008) framework for analyzing the organizational moves/steps in the RACs

Move 1. Summarizing the study
Move 2. Evaluating the study
Step 1. Indicating significance/advantage
Step 2. Indicating limitations
Step 3. Evaluating methodology
Move 3. Deductions from the research
Step 1. *Making reference to previous research*[*]
Step 2. Recommending further research
Step 3. Drawing pedagogic implications

Data Analysis

Following the move identification phase of all discipline-specific RACs, the researchers managed to utilize the non-parametric Chi-Square tests as appropriate tools to analyze the available data as 'frequency counts', and closely observe how *significantly* ESP authors of the mentioned disciplinary RACs differ in their employment of the structural moves/steps within their cross-disciplinary areas. In addition, the researchers tried to ascertain the meaningfulness and size of any 'observed significant difference' between pairs of the groups under investigation through the careful measurement of the 'Effect Size'.

Inter-rater Reliability of the Generic Moves/Steps Identification

As mentioned earlier, to control subjectivity and, as a result, to increase reliability of the identification process of the generic moves/steps of the randomly selected RACs from both discipline-specific territories, the main researcher and the sufficiently-trained and academically qualified external rater or inter-coder independently analyzed the identified constituent moves/steps in disciplinary sample texts. However, according to Cohen (1960) Kappa's values indicated in the following Tables (2, 3, and 4), the calculated inter-rater 'agreement percentages' between the two raters from both the *hard sciences* and *soft sciences* and then the *whole corpus* reliability were shown to be 0.877, 0.844, and 0.857, respectively, which indicates a considerable rate of 'consistency' between the two raters' judgment in their analysis of the discipline-specific RACs as follows:

Table 2: Inter-rater reliability of the 'hard sciences' corpus

Hard Sciences	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measures of Agreement, Kappa	0.87	0.21	23.528	.000
Number of Valid Cases	720			

Table 3: Inter-rater reliability of the 'soft sciences' corpus

Hard Sciences	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measures of Agreement, Kappa	0.84	0.21	22.644	.000
Number of Valid Cases	720			

Table 4: Inter-rater reliability of the 'whole corpus'

Hard Sciences	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measures of Agreement, Kappa	0.85	0.15	32.539	.000
Number of Valid Cases	1440			

Intra-rater Reliability of the Generic Moves/Steps Identification

Also, to calculate '*intra-rater'* reliability, that is, the main coder's consistency in the generic moves/steps identification of the discipline-specific RACs over time, the researcher analyzed the whole corpus twice over a three-week interval whose Cohen's Kappa value of intra-rater agreement percentage was obtained to be 0.892 as indicated below:

Table 5: Intra-rater agreement

Hard Sciences	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measures of Agreement, Kappa	0.89	0.13	33.839	.000
Number of Valid Cases	1440			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

RESULTS

To answer Research Question one on the structural moves/steps of the discipline-specific RACs, the occurrences of the generic moves/steps were counted and then their frequencies were calculated whose results showed substantial differences in the type and frequency of the rhetorical moves/steps of the conclusions under study across the academic hard

sciences and soft sciences. According to the findings of the analyses as indicated in Table 6, Move 1: *Summarizing the study*, was the most frequently utilized move followed by Move 3: *Deductions from the research*, and Move 2: *Evaluating the study*, with the lower rates of the frequency of occurrence than Move 1, respectively.

Table 6. The frequency and percentage of occurrence of the generic moves/steps in the discipline-specific RACs across the academic hard sciences and soft sciences

Moves / **Sciences**		**Move 1**	**Move 2**	**Move(2)**			**Move 3**	**Move (3)**		
				Step1	***Step2***	***Step3***		***Step1***	***Step2***	***Step3***
HARD SCIENCES	**N**	**80**	**19**	**18**	**0**	**1**	**25**	**3**	**7**	**16**
	%	100%	23.75%	22.5%	0%	1.25	31.25%	3.75%	9.37%	20%
SOFT SCIENCES	**N**	**80**	**14**	**8**	**6**	**2**	**62**	**13**	**28**	**39**
	%	100%	17.5%	10%	7.5%	2.5%	77.5%	16.25%	35%	48.75%

However, to clearly sketch the discipline-specific ESP authors' application of the generic moves/steps in the structure of the RACs based on the proposed Yang and Allison (2003) and Moritz, Meurer and Dellagnelo's (2008) move analysis model, the results are also presented as 'Bar Charts' to represent the quality of the generic moves/steps and their frequency of occurrence across the academic 'hard sciences and soft sciences', respectively, as presented below in Figures 2 and 3.

Move 1: Summarizing the study
Move 2: Evaluating the study
Step 1: Indicating significance/advantage
Step 2: Indicating limitations
Step 3: Evaluating methodology
Move 3: Practical Implications and Recommendations
Step 1*: Making reference to previous research***
Step 2: Recommending further research
Step 3: Drawing pedagogical implications/applications

Figure 1: Colours indicating the organizational moves/steps in the RACs following Yang & Allison (2003) and Moritz, Meurer & Dellagnelo's (2008) ESP move analysis model

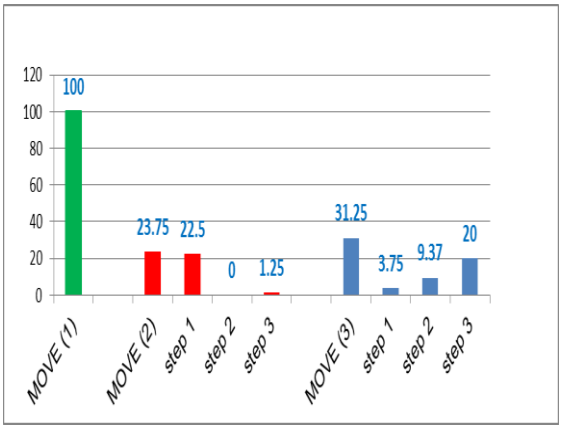

Figure 2: Frequency percentage of the generic moves/steps of the RACs from hard sciences

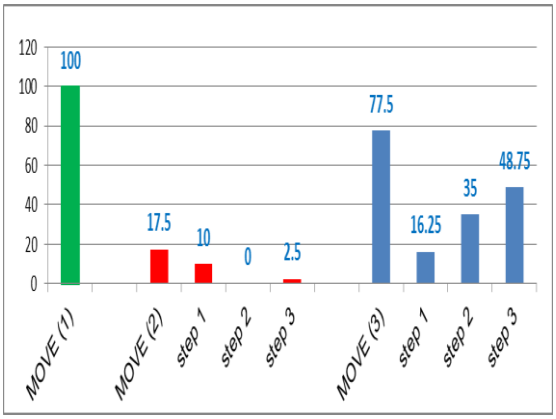

Figure 3: Frequency percentage of the generic moves/steps of the RACs from the 'soft sciences'

DISCUSSION

With respect to Research Question one, as it was shown in Table 6, Move 1: *Summarizing the study*, was the most frequently occurring move (100%) in all discipline-specific RACs across the academic hard sciences and soft sciences. Move 2: *Evaluating the study*, was found in the 'conclusion sections' of 19 RAs (23.75%) in the hard sciences, and in 14 RACs in the soft sciences with seventeen and half percentage points (17.5%).

Regarding the first *step* of Move 2: *Indicating significance/advantage*, it was found in 18 RACs related to the soft sciences (22.5%) and in 8 conclusion sections belonging to the hard sciences RAs (10%). The second *step* of Move 2: *Indicating limitations*, was not found in any of the hard sciences RACs; however, it was in 6 soft sciences RACs (7.5%). The third *step* of Move 2: *Evaluating methodology*, was the least frequently occurred section of the generic organization in this study with a slight difference between the hard sciences (1.25%) and soft sciences (2.5%). However, Move 3: *Deductions from the research*, was repeated in the conclusion sections of 25 hard sciences RAs (31.25%), but occurred in 62 soft sciences RACs *(77.5%).*

While the first *step* of Move 3: *Making Reference to Previous Research*, was found in 3 hard sciences RACs (3.75%), it was utilized in 13 soft sciences RACs (16.25%). The second *step* in this Move which is: *Recommending further research*, was found in the conclusion sections of 7 RAs in the hard sciences (9.37%), but it occurred in 28 RACs in the soft sciences (35%). The last *step* in Move 3: *Drawing pedagogical implications/applications*, was repeated in the conclusion sections of 16 RAs in the hard sciences (20%), but in 39 RAs (48.75%) conclusions in the soft sciences.

The purpose of Move 1: *Summarizing the study*, is to give a brief explanation of the major points and the overall results from the research perspective (Yang & Allison, 2003). In other words, the authors summarize the study by highlighting the key findings. However, it is noteworthy that Move 1 provides a summary of the whole study, and not just a summary of the research results. Further, such a move is clearly identifiable as it is typically applied at the very beginning of the academic RACs. In the present study, Move 1: *Summarizing the study*, was realized through stating the purpose of the research or summarizing the findings of the RAs within the two groups of sciences. For instance:

MOVE 1 - RA Conclusion from HSs:

"*This study aimed to realize how the embedding and failure mode affect the Vult of bucket foundations. To achieve this purpose, a series of FE analyses were done ....****"***

MOVE 1 - RA Conclusion from the SSs:
"The results of this study showed that school-based educational interventions can be considered as a powerful tool to improve MHL in adolescents..."

However, it is worth mentioning that Move 1 occupied the *whole* conclusion section of some papers in the 'hard sciences' through listing the key findings:

- *The use of nano-materials in this study has increased the resistance of glass asphalt mixture in dry and wet conditions….*
- *Glass asphalt blend specimens are more resistant to moisture than normal asphalt blend specimens….*
- *The results of mechanical tests of moisture sensitivity have shown that the use of both additives used in this study has reduced….*

In this study, Move 1: *Summarizing the study*, was the most frequently applied move in the corpus with no difference between the RACs across both the hard sciences and soft sciences which is in line with the previous research on ESP move analysis of the academic RACs utilizing Yang and Allison's (2003) model. The findings of this study tightly agree with the study conducted by Aslam and Mehmood (2014) showing the occurrence of Move 1 in 100% of the RACs across the natural sciences and social sciences.

A possible interpretation of the high occurrence of Move 1 can be attributed to the willingness of authors in both the academic hard sciences and soft sciences to summarize their findings and give a general overview of their work at the end of the study. It implies that researchers from both disciplinary areas consider it '*compulsory'* to summarize their research at the very commencement of the RACs.

In Move 2: *Evaluating the study*, the authors evaluate the study by 1) 'Indicating the significance/advantage' of the study, 2) 'Indicating the limitations' of the study, and 3) 'Evaluating the methodology' as the three corresponding *steps* of the same move, respectively. In this study, Move 2 was the least frequently used move in both the hard science and soft science corpora which is not based on the analytical framework proposed by Yang & Allison (2003). This part of the results is, to some extent, in agreement with Zamani & Ebadi (2016) showing the occurrence of Move 2 in 32% and 30% of Applied Linguistics and Civil Engineering, respectively.

In the present study, Move 2: *Evaluating the study*, was mostly expressed through the 'first step': '*Indicating the significance/advantage'* of the study to state the usefulness and importance of the study with respect to its novelty. For example:

MOVE 2 –**Step** (**1**) –RA Conclusion from HS:
"*…The behaviour of a C-Mn-Si steel under the one-step Q&P process was studied whereas under the two-step Q&P process had been studied in the previous literature…."*

MOVE 2 – **Step** (**1**) –RA Conclusion from SSs:
"*Several studies have been conducted in relation to sustainable development across various fields in Iran, However, determining or coordinating the relationships between them are unprecedented and undefined. Bridging the gap between....***"**

However, the results of the present investigation in regard to the first step of Move 2: *Indicating the significance/advantage*, is to some extent, in line with Zamani and Ebadi (2016), finding this move in 22% and 27% of Applied Linguistics and Civil Engineering RACs, as well as in agreement with Aslam and Mehmood (2014), showing the occurrence of this move in 8% and 36% of Social Sciences and Natural Sciences, respectively.

A possible reason for the occurrence of this step can be ascribed to the discipline-specific researchers' willingness to briefly highlight the focal point of their study. In addition, another reason can be related to the authors' lack of awareness of the '*Significance of the Study'* to show the novelty of their investigations and catch the audiences' attention.

The function of the second step: '*Indicating limitations'*, is to show the drawbacks and limitations of the study. In this research, this step was found in 7.5% of the RACs across the soft sciences, but with no occurrence in the hard sciences RACs. However, ESP authors of the soft sciences RACs directly pointed out the limitations of their study. For instance:

MOVE 2 – **Step** (**2**) –RA Conclusion from SS:
"…Nevertheless, its shortcomings and limitations are recognized by the authors and there are restrictions on comparing the findings of this account with previous work. Tourism research into conditions in many Muslim countries is still limited...."

This part of the findings of the present study is in contrast to Alonso and Zorzo (2016) who found this step in 33.3% of ESP corpus, 16.6% of ELE and SLO corpora.

A probable interpretation of the present results with regard to very low occurrence of the second 'step' of Move 2: *Indicating limitations* in both disciplinary sciences can be the researchers' reluctance to express the limitations and weak points of their study; in addition, the authors may consider expressing this *step* unimportant in the RACs.

In the third 'step' of Move 2: *Evaluating methodology*, authors evaluate the methodology of their research in terms of the weak and strong points. The following exemplifies this step:

MOVE 2 –**Step** (**3**) –RA Conclusion from SSs:
"*…The method adopted in this study only provided a static evaluation. The adopted method is also limited in the sense that it failed to account for multiple interactions that may occur between different factors and indicators****"****.*

This step was the least frequently occurred element in the structure of the generic move/steps according to the conflated ESP move analysis model with only 1 case in the hard sciences, and 2 cases in the soft sciences RACs. The results of this part are consistent with the study done by Zamani and Ebadi (2016), who explored this step in 5% of the conclusions of the applied linguistics RAs, with no occurrence in the conclusions related to the civil engineering corpus.

However, research 'methodology' is one of the most seminal parts of every research and it seems that researchers need to have a high level of self-criticism to evaluate the overall methodology of their studies. In this respect, the very low occurrence of the third step of Move 2 can be attributed to the researchers' unwillingness or lack of self-criticism to evaluate the methodology of their studies. Another possible interpretation of this result may be the scholars' outlook on this step considering it unimportant in the RACs.

Generally speaking, the function of Move 3: *Deductions from the research*, is to relate the research results to the previous studies in terms of similar and different findings; in addition, it presents further research landscapes for the future researchers, and provides implications and applications of the study. A possible reason of the present results concerning

the occurrence of the last move can be the authors' willingness to "provide ways of dealing with problems detected by the study, presenting the line of further study or drawing pedagogic implications" (Yang & Allison, 2003, p. 83).

In this research, Move 3: *Deductions from the research*, was expressed through three corresponding Steps, the first of which is: *Making reference to previous research*. The purpose of the step is to compare and contrast the research results with the previous studies conducted in the same area. In this study, some research articles (RAs) lack this step because their authors have expressed it in the discussion section of the RAs. However, the following is a clear example of occurrence of the first step of Move 3 in the conflated ESP move analysis framework recognized as: *Making reference to previous research.*

MOVE 3 – **Step** (**1**) –RA Conclusion from HSs:
"…In accordance with previous reports, our results indicated that lipid peroxidation increased in the lung tissues after localized irradiation. The decline in the levels of these enzymes in the present study could be elucidated by the fact that …".

The results of the present investigation in regard to the first step of Move 3 are in contrast to the results obtained from the study accomplished by Jahangard, Rajabi, and Khalaji (2014) in which they explored this step in 30% of the conclusion sections of applied linguistics RAs and 10% of the mechanical engineering RACs.

An interpretation for such results can be the authors' willingness to make a comparison between the results of a study and those of other related studies in order to emphasize the importance of the work and also position it within the universal research lines as another of the possible results gained from the study (Alonso & Zorzo, 2016, P. 12). Some RAs, especially those in the soft sciences, made references to previous studies in the discussion section. Therefore, a definite reason for the low occurrence of this first step in the academic RACs within both groups of sciences, as argued by Swales (1990), and Posteguillo (1999), is the fact that the 'conclusion' section is generally regarded as a part of the 'discussion' section.

The main purpose of the second step of Move 3: *Recommending further research*, is to provide the forthcoming researchers with some

practical guidelines for the future studies, which can be helpful and worthwhile for the investigation of the novel and untouched areas of research. In this study, this step was stated by recommending other areas of investigation in the related domains:

MOVE 3 – **Step** (**2**) –RA Conclusion from SSs:
"*...In future work, it is suggested that the method presented in this paper be applied to real data, which is usually time-consuming. Also, modifications should be made to …***"**.
MOVE 3 –**Step** (**2**) –RA Conclusion from HSs:
"*...In this research the model has one threshold with two extreme regimes. Future research in this regard can be pursued in the following lines…."*

A possible reason for the occurrence of this step would be the ESP authors' inclination to continue their favorite line of research by providing possible Suggestions for the future researchers. In addition, another reason is to bridge the gap with respect to the untouched areas of research through suggesting further investigations.

The function of the last (third) step, of Move 3: *Drawing pedagogical implications/applications*, is to provide useful and practical implications/applications of the study. In other words, through drawing pedagogical implications/applications, the researchers take the opportunity to express the pedagogical significance of their study and stress the need for pedagogic changes and modifications (Amnuai & Wannaruk, 2013, 7). In this study, this step was expressed by suggesting the findings as useful guides in practice:

MOVE 3 – **Step** (**3**) –RA Conclusion from SSs:
"Irrespective of the underlying causes, the implication is that although financial development has a favorable effect on the quality of life, and the model shows ….".

However, an interpretation of this finding is the authors' willingness to state the pedagogical significance of their studies and the related applications in the real world or specify the necessity for pedagogic changes and applications.

Concerning the second Research Question, a Chi-Square test was run in order to investigate any statistically significant difference/s in the organizational moves/steps of the RACs across the discipline-specific fields of study whose results revealed a significant difference between the generic moves/steps of the RACs across the academic hard sciences and soft sciences as follows: χ^2 (8, n = 423) = 38.342, P = 0.00. Therefore, the formulated Null Hypothesis that: there is no difference/s between the generic moves/steps characterized in the RACs across the two discipline-specific fields of sciences with respect to their '*frequency* of *occurrence'* was rejected.

Table 7: Chi-Square tests for moves/steps application in the RACs across the academic hard sciences and soft sciences

Value	df	Asymptotic Significance (2-sided)	
Pearson Chi-Square	38.342[a]	8	.000
Likelihood Ratio	41.102	8	.000
Linear-by-Linear Association	23.704	1	.000
N of Valid Cases	423		

4 cells (22.2%) have expected count less than 5. The minimum expected count is 1.21.

It should be noted that the Cramer's V for the Effect Size of the difference/s between the generic moves/steps of the RACs across the academic hard sciences and soft sciences as indicated below in Table (8), is 0.28 which is considered a moderate association.

Table 8: Symmetric measures for the 'effect size'

N of Valid Cases (423)	Value	Approximate Significance
Phi	0.28	.000
Cramer's V	028	.000
	15	

The results of this part genre agree with Amnuai and Wannaruk's (2013) research results where they found that the move structures in the Thai corpus did not follow the Yang and Allison's (2003) framework unlike the

RACs in the International corpus as a result of the limited application of Moves 2 and 3.

However, the main differences between the hard sciences and soft sciences RACs with regard to the generic moves/steps occurred in the last Move (Move 3): *Deduction from the research* and its corresponding steps. A possible reason for these findings can be the higher tendency and emphasis on the 'last move' and its respective steps on the part of the soft sciences authors to express their research through this move and its constituent steps in comparison to those English writers from the hard sciences.

Overall, the soft sciences RACs contained more generic moves/steps than those selected from the hard sciences. However, a possible reason for the significant differences can be attributed to the higher awareness-of-genre levels of the soft sciences ESP authors of the RACs. Moreover, another possible interpretation for these findings may be related to the journals and reviewers' policies and views on the articles published in individual journals, since some editors/reviewers might demand rigid rhetorical move patterns, whereas others may have rhetorical flexibility in the employment of the organizational moves/steps in the body of the academic RACs (Alonso & Zorzo, 2016, p. 130).

CONCLUSION AND IMPLICATIONS

The main purpose of the present research was to investigate the impact of probable variation/s in discipline-specific English on shaping ESP authors' intellectual and schematic borders in the employment of the generic moves/steps in the structure of their RACs across the academic 'hard sciences and soft sciences'. Regarding Research Question one on the 'Type' of the generic 'moves/steps' under study, the results obtained from the move/step identification process and frequency counting indicated that Move 1: *Summarizing the study*, was the most frequently applied move in both the hard sciences and soft sciences RACs. Move 2: *Evaluating the study*, was used in less than a quarter of the RACs in both groups of sciences. The corresponding steps of Move 2, especially *indicating limitations* and *evaluating methodology*, were applied 'scantly' in the RACs. Move 3, *Deductions from the research*, was employed moderately in the RACs with a difference observed in both sets of sciences. The steps related

to Move 3 especially '*making reference to previous research*' and '*recommending further research*' were utilized in less than a quarter of the RACs, while '*drawing pedagogical applications/implications*' was used more frequently. However, the frequency of occurrence of Move 3 and its three corresponding steps was found to be different across the two cross-disciplinary areas of sciences.

In addition, the results unveiled that the structural moves/steps of the RACs across both discipline-specific territories in this study did not strictly follow the proposed model of ESP move analysis as a 'freeze frame'; in this regard, it was concluded that the ESP writers as ever-developing members of the research community manipulate the model of the conventionally recognized genre features based on the novel and ever-dynamic circumstances of the academic and scientific contexts which undergo change over time.

The second Research Question examined if there were any significant differences in the 'frequency' of occurrence of the organizational moves/steps in the discipline-specific RACs across the hard sciences and soft sciences. Contrary to the results of previous studies, the results obtained from the Chi-Square tests revealed statistically significant differences between the conclusion texts under study across the two fields of sciences. As mentioned earlier, the occurrence of Move 2 was slightly different in the RACs in both cross-disciplinary territories, whereas the frequency of Move 3 and its three subordinate generic Steps, especially the third step: *drawing pedagogical applications/implications*, were explored to be considerably different in the conclusion sub-genres across the hard sciences and soft sciences. Therefore, it was concluded that discipline-specific variations in English can shape the ESP authors' schematic borders and their rhetorical style in the employment of the structural moves/steps in the body of RACs within their discipline-specific areas of expertise.

Pedagogical Implications

The results of the present research could have pedagogically significant implications for ESP postgraduate students as non-native English writers researching in diverse disciplinary fields of study, raising the authors' metacognitive and critical awareness of the way RA genres are organized and work; in addition, the findings would enhance the academic authors'

consciousness and sensitivity to the ever varying socio-rhetorical needs and expectations of audiences across the field-specific research genres (Tardy et al., 2020), and to the principal interplay between the choice of patterns of language use and the communicative purposes governing the generic structure of the academic RAs in general and the RACs in particular.

However, concerning implications relevant to ESP teachers and teacher education program professionals, the findings would be 'supportive' in that it gives the ESAP Writing instructors a fundamental role in scaffolding the discipline-specific scholars' writing ability to become as competent and creative English writers as possible in producing the rhetorically sound academic RACs across the diverse disciplinary areas; moreover, another pedagogic implication can be ESP teachers' quality of 'empowerment' where they can give more control to ESP academics on their own writing by explicitly exposing them to a variety of needs-based genres aimed at enabling ESP authors to identify the patterns of generic variation in their discipline-specific academic RAs.

The findings of this study may be also useful for English academic journals of diverse areas of sciences in providing ESP scholars with a framework to professionally navigate the rhetorical organization of their discipline-specific RAs and come up to the norms and expectations of the target research community. Moreover, the results may have inspiring and practical implications for the cross-disciplinary candidates completing the Master's theses and Ph.D. dissertations as they can raise their awareness of how to structurally organize their field-specific content of their disciplinary studies in line with the specified generic preferences and conventions of the academic research community.

Suggestions for Further Research

The present study investigated the prototypical generic move patterns (macro-structural components) of the discipline-specific RACs across the academic hard sciences and soft sciences from ESP move analysis perspective; however, to obtain more reliable results, it is suggested that future research could also adopt a lexico-grammatical analysis methodology and unpack such 'micro-structural' features, for instance, as verb phrases, nominalizations, stance features and meta-discursive devices of the mentioned academic part genres applying SFL approach to genre analysis in

order to gain more insight into how differently the discipline-specific authors make choices of written semiotic resources in the construction of their RACs to fulfil the intended communicative goals.

To the best of researchers' knowledge, ESP genre studies have so far focused on essentially word-based textual analysis of the academic RAs genre across diverse disciplines and cultures with the centrality of communicative purpose and audience. Yet, it may also prove useful to the future genre scholars to conduct emically-inspired studies on the academic RAs writers as 'users of specific genres', drawing on such ethnographic tools and data-collection methods as telephone, online, face-to-face, or semi-structured interviews, questionnaires, and observations, in order to obtain a deeply contextualized understanding of their own attitude and awareness of the socio-rhetorical specifications of the academic genres and especially of the multi-faceted resources that the scholarly communities are likely to bring to their application of the generic moves/steps in the RACs across different disciplines.

Given the increasing innovations in the technological and scientific areas within the currently predominant digital communication, thereby proving ESP writers with a much wider scope of the newly-emerging digital genres like webcast or podcast interviews, webpages, research announcements, and portfolios (Lim & Polio, 2020) for use on the virtual space platforms along with the possibility of simultaneous application of the multiple modes of genres as letters, sounds, motions and pictures, the authors of the academic RAs can communicate their studies with broader numbers of their specific audiences globally at once. Therefore, more future investigations are needed to detect how discipline-specific authors approach the construction of the rhetorical moves/steps of their RAs as the worldly recognized channel of professional communication in light of the inherent novelty and development as a potential source of variation in the emerging academic genres in this digitalized milieu.

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