

# A Comparative Study of Generic Structure of Applied Linguistics and Chemistry Research Articles: The Case of Discussions<sup>1</sup>

Hassan Soodmand Afshar<sup>2</sup>, Mehdi Doosti<sup>3</sup>, & Hossein Movassagh<sup>4</sup>

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## Abstract

This genre-based study investigated the cross-disciplinary variations in the rhetorical structure of the Discussion sections of 104 applied linguistics and chemistry research articles (RAs), drawing upon Basturkmen's (2009, 2012) framework and taking into account the new insights proposed by Bhatia (2004), Shehzad (2008), and Lim (2012). To this end, in addition to collecting quantitative data and conducting frequency and chi-square analyses, a number of semistructured interviews were also conducted with some distinguished chemistry scholars and applied linguistics experts to triangulate the data and get a fuller understanding of the quantitative results. Results of the chi-square analyses revealed significant variations in the way the authors in the 2 disciplines employed moves, steps, and substeps to realize the purpose of the Discussion sections. Findings might prove fruitful for postgraduate students and novice researchers in chemistry and applied linguistics to help them write more effective Discussion section in their research articles.

**Keywords:** Applied Linguistics; Chemistry; Genre Analysis; Discussion; Move Structure; Research Articles (RAs)

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<sup>2</sup>Corresponding author, Department of English Language, Faculty of Humanities, Bu-Ali Sina university, Hamedan, Iran; hassansoodmand@gmail.com

<sup>3</sup>Department of English Language, Faculty of Humanities, Bu-Ali Sina University, Hamedan, Iran; mehdidoosti2008@gmail.com

<sup>4</sup>Department of English Language, Faculty of Humanities, Bu-Ali Sina University, Hamedan, Iran; hussein\_movassagh@yahoo.com

## 1. Introduction

Over the past few decades, researchers in various disciplines have been interested in publishing the results of their research articles (RAs) in international English-medium journals (Curry & Lillis, 2004), which might be due to the fact that they intend to share their findings with their international disciplinary community and “to gain international recognition” (Martin, Rey-Rocha, Burgess, & Moreno, 2014, p. 57). In fact, publishing in high-impact English-medium journals is one of the important evaluation criteria for professional promotion and salary raise in many countries (Curry & Lillis, 2004) and is a prerequisite to Ph.D. graduation in some countries (Huang, 2010). Nevertheless, due to unfamiliarity with RA genres and conventions of publication, researchers might experience difficulties to meet the expectations of journal reviewers and members of their disciplinary community (Matrin et al., 2014). Therefore, it seems imperative that researchers, particularly novice researchers and students, become familiar with the rhetorical structure of RAs in their disciplines to be able to write each section of the RA as expected.

Since the introduction of the term *genre* by Swales (1981), who studied the discourse structure of RA Introductions, genre analysis of academic texts, particularly RAs in various disciplines, has increasingly become popular. Genre analysis has concentrated mostly on English for academic purposes (EAP), particularly on academic articles as a specific genre (Dudley-Evans, 1994). A review of the literature in the field reveals that several genre-based studies and move analyses have been conducted on various sections of RAs. However, the Discussion section of RAs, which is believed to be of crucial importance by genre analysts probably due to the fact that it is considered to be rhetorically complex (Uzuner, 2008) and the most challenging part to write (Li, 2002, 2007; Martin et al., 2014), has not received due attention. In fact, the Discussion section is believed to be of crucial importance in RAs in many disciplines (Basturkmen, 2012), probably because Discussion is the place where researchers strive to support their claims by providing explanations for their results and/or by referring to an explanation provided in the literature (Basturkmen, 2012; Kanoksilapatham, 2012). Therefore, this section determines the extent to which an RA has been successful in attracting readers and meeting the expectations of the research community (Kanoksilapatham, 2012). These issues might be the reasons why Discussion sections are meticulously reviewed and harshly criticized by journal editors and reviewers. In other words, the effectiveness of writing the Discussion section is most likely to determine whether the RA is likely to be published or not. Accordingly, postgraduate students and novice researchers in any discipline who wish to publish their work and share their theories and thoughts with their research community are required to get familiar as

much as they can with the rules and conventions of writing various sections of an RA, particularly the Discussion section.

Genre awareness-raising, which involves raising students' awareness of text features (i.e., lexicogrammatical features, organization, communicative function, disciplinary conventions; Hyland, 2006; Stoller & Robinson, 2013), is a technique that teachers can employ in EAP courses offered to students and novice researchers to make them aware of the actual communicative practices of their disciplines in order to produce better writers. In fact, to become an independent writer and develop a personal and idiosyncratic way of writing within the framework of a discipline, one first needs to become familiar with the disciplinary conventions and expectations of their discourse community (Hyland, 2006). Therefore, due to its complex nature and importance, this genre-based study investigated the rhetorical structures (moves, steps, and substeps) of RA Discussions (RADs) in the two disciplines of applied linguistics (ALs) and chemistry with the aim of helping students and novice researchers write more effective Discussion sections.

### ***1.1. Theoretical Framework of the Study and Literature Review***

A number of frameworks (e.g., Basturkmen, 2009, 2012; Holmes, 1997; Hopkins & Dudley-Evans, 1988; Yang & Allison, 2003) have been proposed for analyzing RADs. Holmes (1997), for instance, analyzed the disciplinary variations in the move structure of the Discussion section of RAs from the disciplines of history, political sciences, and sociology. Holmes observed that the most common moves in the Discussion section of all the three disciplines were 'Generalization' and 'Statement of Results.' Furthermore, the most common moves used to open a Discussion section were reported to be 'Statement of Results,' 'Background Information,' and 'Generalization,' respectively, and those used to close the section were observed to be 'Recommendation' and 'Generalization,' respectively. Also, Hopkins and Dudley-Evans (1988) introduced a list of moves for the Discussion section of RAs, which they considered as the main options for the writers, although they did not claim that their framework was exhaustive. Their framework consists of 11 moves as follows (Hopkins & Dudley-Evans, 1988, p. 118):

1. Background Information,
2. Statement of Result (S.O.R.),
3. (Un)expected Outcome in which the writer comments on whether the result is expected or not,
4. Reference to Previous Research (Comparison) in which the writer compares his or her result with those reported in the literature,

5. Explanation of Unsatisfactory Result in which the writer suggests reasons for a surprising result or one different from those in the literature,
6. Exemplification in which the writer gives an example to support his or her explanation,
7. Deduction in which the writer makes a claim about the generalizability of the particular results,
8. Hypothesis in which the writer makes a more general claim arising from his or her experimental results,
9. Reference to Previous Research (Support) in which the writer quotes previous work to support his or her deduction or hypothesis,
10. Recommendation in which the writer makes suggestions for future work,
11. Justification in which the writer justifies the need for the future work recommended.

However, reviewing Hopkins and Dudley-Evans' (1988) framework and criticizing it for its adoption of single-level scheme of analysis (move), Yang and Allison (2003) proposed a two-level account (moves and steps) of RADs analyzing a corpus of 20 RAs in ALs. They, thus, proposed a hierarchical seven-move framework with a number of steps realizing some of the moves, which, as they claimed, still included all the features identified by Hopkins and Dudley-Evans (1988). They observed that the move 'commenting on results' had a frequent occurrence in RADs and was an obligatory move, whereas the moves 'reporting results' and 'summarizing results' occurred less frequently and were regarded as quasi-obligatory. However, they found the move 'reporting results' was an obligatory move in the Results section of the ALs RAs. They identified three optional moves in the Discussion section, as well, 'summarizing the study,' 'evaluating the study,' and 'deductions from the research,' which are mainly moves also found in the Conclusion section of RAs.

Drawing upon Yang and Allison's (2003) framework as the point of departure, Basturkmen (2009) investigated how expert and novice writers in the field of language teaching commented on the results of their research, focusing specifically on M4 ('commenting on results') of the framework. She argued that providing background information (M1) was followed by summarizing the results (M2), reporting a result (M3), and commenting on the result (M4). She found that the majority of the RAs included sequences of M3 ('reporting results') and M4 ('commenting on (the) results'). She termed this sequence, which "was repeated for

as many results as the writers wished to discuss” (p. 245), Result-Comment Sequence. That is, the writers of the RAs focused and dealt with the results of their research one by one, reporting a result, discussing it, then reporting another result and commenting on it. In terms of M4 (‘commenting on (the) results’), she reported that the writers selected three possible steps to comment on a result including ‘explaining a result,’ ‘comparing a result to a result reported in the literature,’ and ‘evaluating a result.’ In Yang and Allison’s (2003) model, this move is realized through four steps. However, Basturkmen (2009) argued that distinguishing ‘interpreting results’ from ‘accounting for results’ “proved problematic” (p. 245). Accordingly, she condensed the two steps into one (‘explaining the results’) by using the verb ‘explain’ as a synonym for both ‘interpret’ and ‘account for.’ Finally, she argued that “commenting on results” had a crucial role in the Discussion sections of ALs RAs, as also emphasized by Yang and Allison (2003).

In a more recent analysis, Basturkmen (2012), drawing upon her previous framework (Basturkmen, 2009), scrutinized ten RADs in the field of dentistry and discussed the findings in terms of disciplinary variation. She asserted that although some disciplinary variations were observed in the generic structure of ALs and dentistry RAs, the framework could generally be applied to the RADs in Dentistry. In most of the RAs analyzed, she observed the use of M1 and M2 of the framework. The three steps realizing M4 (‘commenting on (the) result’) were also observed in dentistry RADs. Furthermore, the Result-Comment Sequences (repeated sequences of M3 and M4) were observed in most of the RAs. However, she found two additional moves which were termed ‘evaluation of the study’ (M5) and ‘implications for further research, clinical practice or policy’ (M6).

Similarly, Stoller and Robinson (2013) analyzed the organizational features of chemistry and ALs RAs and converted them into some easy-to-interpret move structures to be effectively used in classrooms as a pedagogical tool to raise chemistry and ALs students’ consciousness about the predominant organizational patterns in the RAs they read and help them improve their writing. In their study, a team of Chemists and Applied Linguists selected nearly 60 chemistry RAs from six high-impact journals (10 RAs from each) in the field to be analyzed. After analyzing the RAs, they found that chemistry RAs “fall on a continuum bounded by fully separated Results and Discussion sections at one end and fully integrated Results and Discussion sections at the other” (p. 51). In case of RAs following stand-alone Discussions, they found that the Discussion section of the RAs consisted of two moves with one briefly reminding the reader which results would be discussed (M1) and the other signaling the conclusion (M2). They also found a submove for M1 which proceeded with an interpretation of results connecting the work with the literature by offering explanations and comparing the work with other works. They

also found two submoves for M2 with the first submove providing a brief summary of the work and the other offering implications and/or applications of the work.

Fallahi and Erzi (2003) examined the move structure of the Discussion sections of 61 RAs selected from high-impact international language teaching journals (e.g., *Applied Linguistics*, *TESOL Quarterly*) and found 11 moves including ‘background information,’ ‘presenting a result,’ ‘presenting a finding,’ ‘explaining unexpected outcomes,’ ‘making reference to previous research,’ ‘explaining the results,’ ‘making generalizations from the results,’ ‘introducing the limitations,’ ‘making suggestions for further research,’ ‘restating the problem,’ and ‘restating the procedure.’ They merged the 11 moves and introduced a three-part Discussion, including Introduction, Evaluation, and Conclusion, which is consistent with Dudley-Evans’ (1994) three-part framework. However, they found that the move order of language teaching RADs was partly different from the order followed by natural sciences, as proposed by Hopkins and Dudley-Evans (1998). Moreover, they found that the moves of RADs in language teaching occurred with different frequencies with ‘presenting a finding’ and ‘making generalizations from the results’ appearing more frequently in RADs than other moves did.

The reliability and dependability of the results obtained through the genre analysis of different sections of RAs depend on how the rhetorical structure of RAs is analyzed and interpreted. Analyzing the rhetorical structure of RAs, genre analysts pay attention mostly to move sequences as well as the frequency of occurrence of each move, step, and substep (Lim, 2012). However, a few genre studies (e.g., Lim, 2012; Shehzad, 2008) seem to have considered the supporting linguistic features of the moves, as well. Lim (2012), for instance, argued that identifying prominent linguistic features (i.e., lexical items and syntactic structures) used to perform the various communicative functions provides information on how writers use strategies in various situations related to their discipline, which can help novice researchers write articles acceptable to disciplinary gatekeepers (e.g., journal editors and reviewers).

Going beyond the lexicogrammatical and functional features of the text, Bhatia (2004) proposes an ethnographic approach to genre analysis involving features which “constrain the construction of genre from the point of view of factors such as the impressions, beliefs, and perceptions of experts associated with a particular genre, the processes of its construction, choice of modes available, etc.” (pp. 132-133). He argues that discourse as genre accounts for both the way text is constructed and the way it is interpreted, used, and exploited in specific professional contexts to achieve specific disciplinary goals. As Bhatia (2004) puts it, given today’s interdisciplinary and dynamic world of work, it is virtually impossible to keep the individual generic boundaries intact. Therefore, taking Bhatia’s (2004)

ethnographic perspective into consideration, it appears essential that the beliefs and perceptions of experts be carefully taken into account by genre analysts when discussing the common rhetorical structure of a specific genre.

### ***1.2. Objectives, Significance of the Study, and Research Questions***

The present study was designed to investigate cross-disciplinary variations in the rhetorical structure of Discussion sections of ALs and chemistry RAs, drawing on Basturkmen's (2009, 2012) framework. This framework was used because it is comparatively comprehensive and is a commonly used framework which has accounted for the structural organization of RADs in such diverse disciplines as ALs and dentistry. Nevertheless, to utilize the new insights proposed by recent related research, the suggestions and findings of Bhatia (2004), Lim (2012), and Shehzad (2008) were also taken into account.

In this study, we selected one discipline from humanities and one from natural sciences, each with its own requirements and expectations, so that we could delve deeply into the possible variations in the rhetorical structure of their RAs. ALs was chosen as an appropriate representative of humanities because it draws upon such diverse feeder disciplines as linguistics, psychology, sociology, and other branches. Moreover, the authors of the present study are all ALs experts and, thus, familiar with the rhetorical structure and organization of the RAs written in this field—a fact which makes the analyses and interpretation of the data more dependable. On the other hand, it should be noted that we could have chosen any discipline from natural sciences (e.g., biology, botany, etc.) for analysis because we did not intend to generalize the results beyond the disciplines under investigation. In this regard, chemistry was chosen mainly because we had easier access to internationally well-known, distinguished chemistry scholars/researchers whose insightful comments we used in the analysis of the data and in the interpretation of the results through the interviews we conducted with them.

Another rationale behind the study was that although several studies have been conducted to investigate the generic structure of ALs RADs, only a few of them have taken into consideration recent research findings on the rhetorical structures of RADs (e.g., Basturkmen, 2009, 2012; Bhatia, 2004; Lim, 2012; Shehzad, 2008). Furthermore, to our knowledge, very few studies so far have investigated the generic structure of chemistry RADs, which means less is known about the rhetorical structure of this section in chemistry. This study is, thus, significant in the field in that it employs the triangulation of the data by drawing upon Bhatia's (2004) ethnographic perspective to genre analysis and contributes significantly to the knowledge of the topic under investigation. Unlike most previous genre-based studies which based all their conclusions upon the analyses and interpretation of the quantitative data, the present study also employed several

semistructured interviews with experts in both disciplines in order to enhance the dependability of the results and to get a fuller understanding of the quantitative data by exploring why the differences existed between the two disciplines. Thus, we expect that this genre-based study furthers our understanding of the generic structures of ALs RADs and offers new insights into the generic structures of chemistry RADs. Additionally, the study might be of significance in that, in comparison to previous studies (e.g., Basturkmen, 2009, 2012; Yang & Allison, 2003), it draws upon a relatively large corpus (104 RAs).

Thus, we sought answers to the following research questions in the present study:

1. What are the differences between the generic structures of RADs in the two disciplines of chemistry and applied linguistics?
2. Why are some specific moves and/or steps used less frequently in chemistry and more in applied linguistics or vice-versa?

## **2. Method**

### **2.1. Data Collection and Analysis**

To collect a rather large sample representing the move structures used in the RADs, a total of 104 RAs from ALs and chemistry published between 2000 and 2015 comprised the corpus for the present study. The ALs journals from which we selected the articles to be scrutinized in the study were all recognized high-impact journals which were mostly devoted to problems of foreign language teaching and learning and mainly published full-length quantitative research studies. The chemistry journals from which we selected the articles were also recognized high-impact journals which were mostly devoted to empirical studies in the field and mainly published full-length quantitative research studies. Thus, 52 empirical RAs (13 RAs per journal) were randomly selected from four accredited journals in ALs, namely *Language Learning* (LL), *The Modern Language Journal* (MLJ), *Second Language Research* (SLR), and *System*. Moreover, 52 RAs (13 RAs per journal) were randomly chosen from four well-established high-impact journals in chemistry, namely *Applied Catalysis B: Environmental* (ACBE), *Electrochemistry Communications* (ECC), *Journal of Power Sources* (JPS), and *Electrochimica Acta* (ECA). The length of the ALs RAs analyzed ranged from 3,000 to 12,000 words, whereas the length of chemistry RAs analyzed ranged from nearly 2,000 to 10,000 words. All the RAs selected for the analysis were empirical studies which followed the conventional Introduction-Method-Results-Discussion (IMRD) structure (Swales, 1990). The reason for confining the scope of research to only empirical RAs was that other types of RAs (e.g., review articles or state-of-the-art papers) are believed to be different genres and were not, thus, included in the study. It should be



noted that all the articles analyzed included a Conclusion section in addition to the Discussion section. The reason for selecting these types of articles was that those articles were more likely to include all the relevant moves, steps, and substeps to realize the objectives of their Discussions.

The data were analyzed through counting and tabulating the frequency of the occurrence of each move and (sub)steps realizing them. Then, chi-square analyses were run in SPSS to explore the interdisciplinary variations in the generic structures of the RADs in ALs and chemistry. It should also be mentioned that all the three researchers of the present study analyzed the data separately to identify the moves, steps, and substeps in all the selected RADs by considering not only their communicative functions but also their linguistic realizations (Lim, 2012; Shehzad, 2008). Due attention was especially paid to the identification of discourse markers, lexical items, linguistic cues, boundaries between move and steps, and their sequencing and patterning. Besides, to make sure of the dependability of the analyses, the three researchers compared their results obtained and discussed them in a series of group discussion sessions. The discrepancies (less than 5%) were negotiated until final compromise was reached. However, in order to minimize the likelihood of error in the analysis of the RAs and to get a deeper understanding of the results, eight distinguished chemistry professor researchers who were faculty members at Bu-Ali Sina University, Hamedan, and had prolifically published in peer-reviewed, high-impact international journals were consulted. Three of the chemistry professors interviewed were, in fact, world-renowned researchers who had been selected as the world's top 1% 'scientists' by Essential Science Indicators (ESI) of Thomson Reuters. Besides, eight ALs professor researchers who were Faculty members of various Iranian universities (e.g., Bu-Ali Sina University, Razi University, Kermanshah University of Medical Sciences, etc.) were interviewed separately. The interviews were, in fact, conducted based on Bhatia's (2004) ethnographic approach in order to ensure the dependability of the results. It took 30 to 45 min to interview each professor. After obtaining the professor researchers' permission and consent, the interviews were audiorecorded for further transcription and content analysis.

### 3. Results

#### 3.1. Results of Move Analysis of Applied Linguistics RADs

Table 1 indicates the frequency of the occurrence of the moves and steps used to realize them in ALs RADs:

Table 1. *Frequency of Occurrence of Moves and Steps Realizing Them in ALs RADs*

Moves and Steps realizing Them in RADs	Frequency of Occurrence				Total (Out of 52)	Percent
	System (Out of 13)	MLJ (Out of 13)	LL (Out of 13)	SLR (Out of 13)		
(M1) <i>background information: review of research purposes, theory, methodology</i>	10	2	7	4	23	44.23%
(M2) <i>summarizing results: integration of no. of specific results</i>	5	9	7	3	24	46.15%
M3 <i>reporting a result</i>	13	13	13	13	52	100%
M4 <i>commenting on (the) result</i>	13	13	13	13	52	100%
Step A 'explaining the result'	13	13	13	13	52	100%
Ai) providing alternative explanations for the same result, A1, A2, A3 etc.)	10	8	10	11	39	75%
Aii) referring to an explanation provided in the literature	8	7	6	5	26	50%
Aiii) evaluating an explanation	3	1	1	0	5	9.61%
Step B 'comparing with result in literature'	13	13	12	12	50	96.15%
Step C 'evaluating the result'	2	6	4	1	13	25%
Ci) 'importance of the result'	1	3	2	1	7	13.46%
Cii) 'reliability of the result'	1	0	0	0	1	1.92%
Ciii) 'evaluating a result, claim or recommendation in the literature, in view of the present result'	2	3	2	0	7	13.46%
(M5) <i>evaluating the study</i>	3	5	6	1	15	28.84%
(M6) <i>implications for further research and pedagogic implications</i>	2	11	9	4	26	50%

As Table 1 indicates, M1 ('background information') and M2 ('summarizing results') were optional moves used by less than half of the ALs writers. Excerpts 1 and 2 below show how M1 was used by the ALs authors, mostly at the opening paragraph of the Discussion sections to remind readers of the research purpose, research questions, and/or research methodology:

- (1) **This experiment was designed to test whether** the interpretation of subject pronouns in intrasentential contexts by near-native adult speakers

of Italian is different from that of native Italian speakers. (*Second Language Research*, 22, 2006, 339-368)

(2) **The main purpose** of this study was to **examine** the connections between positive goal interdependence and positive resource interdependence among learners and their perceptions of the degrees of social support and selected aspects of class climate, namely, valuing heterogeneity, alienation from school, and fairness of grading. (*System*, 35, 2007, 229-240)

Excerpts 3 and 4 indicate how M2 was utilized by the ALs writers to give the readers a brief summary of the findings before fully reporting and explaining them:

(3) **The results reveal that** the role played by LAA depended on a combination of three factors- the type of corrective feedback provided (DF or ME), whether the learners were required to revise the corrected text (+Revision/-Revision), and the target structure. (article/hypothetical conditional; *System*, 49, 2015, 110-119)

(4) **To summarize the above result** of different testing measures in terms of their support for the different hypotheses, the sentence combination test and the grammaticality judgment test partially supported the prediction of the NPAH, . . . . (*Language Learning*, 53, 2003, 285-323)

M3 ('reporting a result') and M4 ('commenting on (the) result') were found to be obligatory moves used by all the ALs writers. Excerpts 5, 6, and 7 indicate how M3 is realized by the ALs authors in their RADs:

(5) Experiment 1 **showed that** the minimal processing effort assumption of Relevance Theory constrained both groups of speakers' processing of ambiguous sentences. (*Second Language Research*, 20, 2004, 232-255)

(6) **The results of this study indicate that** task difficulty is an important variable in writing, particularly at the beginning levels. The novice secondary school learners in this study performed better on descriptive than on narrative or expository tasks. It should be noted, however, that the present-tense narrative tasks were within the capabilities of both level 1 and level 2 students. As expected, performance on the expository task was poorer for students at both levels. (*The Modern Language Journal*, 84, 2000, 171-184)

(7) **Our main finding is that** ICF is more effective in the short term for improving comprehensibility than listening only interventions. Whereas the difference between the two groups is large and significant, the overall

effect was relatively small. Only 22% of participants in the Listening only-group and only 44% in the ICF-group improved their comprehensibility in the short term. (*System*, 41, 2013, 25-37)

In relation to M4, it was observed that the majority of the writers dealt with their findings one by one via a series of Results-Comments Sequences (Basturkmen, 2009). That is, they reported one finding and explained why that particular result was obtained making a reference to an explanation provided in the literature and/or providing an alternative explanation. Then, they reported another finding and provided explanations for it. This sequence was observed to be repeated for all the results singled out by the writers to be discussed (as also reported by Basturkmen, 2009). M4 was mostly realized through Step A (100%), ‘explaining the result’ and Step B (96.15%), ‘comparing the result with results reported in previous studies in the literature.’ The authors commented on their results by either ‘providing an explanation using their common sense’ (i.e., Step Ai, see excerpts 8, 9, and 10) or ‘referred to an explanation provided in the literature’ (i.e., Step Aii) to justify the results (see excerpts 11 and 12):

(8) **The reason may be that** the learners’ parsing of the single sentences in Experiment 1 did not appear to be affected by their English proficiency levels. (*Second Language Research*, 20, 2004, 232-255)

(9) **One explanation is that**, given a multiple-choice vocabulary test with options in English, males and females benefit equally from a CALL lesson that gives them the opportunity to look up the correct meaning of the L2 text. (*The modern Language Journal*, 84, 2000, 214-224)

(10) **Transfer may be responsible for** the nonnative speakers’ low scores on the aspiration stimuli, since a glottal stop occurs in emphatic speech in Spanish while aspiration does not occur in Spanish. (*Second Language Research*, 21, 2005, 325-358)

(11) **Posited by Bialystok (1993)**, two cognitive components of language processing—analysis of knowledge and control of processing—**can account for** the improvement of the explicit group in the present study. (*System*, 33, 2005, 463-480)

(12) **The second reason for the difference** may have to do with language attitudes, which have well-documented effects on comprehension (**Dalton-Puffer et al., 1997; Gill, 1994; Mackey & Finn, 1997; Pihko, 1997; Plakans, 1997; Toro, 1997**), that is, the more prestige accorded to a language or dialect, the better the comprehension of it. (*Language Learning*, 54, 2005, 37-69)

Excerpts 13, 14, and 15 demonstrate how authors in the two disciplines applied Step B of M4 to compare the results with those reported in previous studies in the literature:

(13) The findings of the present study **compare favorably to the results of previous studies** of language-skill-specific anxiety and its relationship to certain language skills, for example, reading in Spanish (Sellers, 2000), reading in Japanese (Saito & Samimy, 1996), and speaking and writing in English (Cheng et al., 1999). (*The Modern Language Journal*, 89, 2005, 206-220)

(14) This result is, however, **in agreement with** that of Burnham and Francis (1997) for the discrimination of some tone pairs. (*Language Learning*, 54, 2004, 681-712)

(15) Although the results of this study support the order of tasks implied by the ACTFL Guidelines (1986), **they cast doubt on** the Guidelines' characterization of the novice and intermediate levels. (*The Modern Language Journal*, 84, 2000, 171-184)

Furthermore, one fourth (25%) of the writers offered 'evaluations for their explanations' (Step C, see excerpt 16) mostly by underscoring the importance of the result (Step Ci) and/or 'evaluating a result, claim, or recommendation in the literature, in view of the present result' (Step Ciii):

(16) **These and previous findings encourage** teachers to enhance the cultural aspect of the first-and second-year FL college programs by using a curriculum that includes an authentic video component. This message is especially **important for teachers** . . . . (*The Modern Language Journal*, 86, 2002, 36-53)

Finally, it was observed that M5 ('evaluating the study') and M6 ('implications for further research') had been used by more than one fourth of the authors in the Discussion section of the RAs we analyzed. The presence of such moves was not reported by Basturkmen (2009) for the ALs RAs, but was observed by Basturkmen (2012) in dentistry RADs. As indicated in Table 1, 28.84% of the ALs authors evaluated their research in terms of a weakness in the design, a limitation, or significance of their study (excerpts 17, 18, 19, 20, 21, and 22):

(17) **The present study is unique among RC studies** in SLA for its use and analyzes of both reception and production tasks in assessing the difficulty of different RC sentence types. (*Language Learning*, 53, 2003, 285-323)

(18) The results of the present study **add to the literature** on the connections of cooperation among learners to social support and positive classroom climate. (*System*, 35, 2007, 229-240)

(19) Before drawing conclusions from this study, we stress that any implications should be interpreted **cautiously** in light of the following **constraints**.... **Keeping the above limitations in mind**, we suggest the following conclusions in response to the research questions. (*The Modern Language Journal*, 86, 2002, 36-53)

(20) Thus, the present study **may be added to the wealth of promising experimental SLA studies** in which real languages, semiartificial, or artificial languages are used in testing SLA theory in the laboratory (e.g., Hulstijn, 1997; de Graaff, 1997), in the classroom (e.g., Doughty & Williams, 1998), or in a naturalistic setting (e.g., Lin & Hedgcock, 1996), all of which bring us a step closer to understanding adult L2 acquisition process. (*The modern Language Journal* 85, 2001, 226-243)

(21) The experimental design of the study results in **several limitations**. One is generalizability. . . . However, it is clear that our study has **limited** generalizability because of the **limited** number of dialects within each category. (*Language Learning*, 54, 2005, 37-69)

(22) **One obvious weakness with this research** is the low number of learners.... A second **potential weakness** is that any differential learning of inflections for tense compared to inflections for person and number remains to be teased out from the data. (*Language Learning*, 56, 2006, 507-566)

Table 1 also shows that half of the ALS writers suggested further research was needed to alleviate the limitations in their research or to answer a question which was not the main focus of their study (excerpts 23, 24, and 25). Moreover, some of them offered pedagogical implications based on the results of their research in the Discussion section of the RAs (see excerpts 26, 27, 28, and 29):

(23) **Further research** targeting the use of translations and guessing strategies by males and females, as well as their vocabulary retention, **should replicate this study** with these variables in mind. (*The Modern Language Journal*, 84, 2000, 171-184)

(24) Deep vs. surface transfer, however, still **needs to be further investigated**. (*Second Language Research*, 22, 2006, 339-368)

(25) **Further research** should target means to promote correct inferences and verification of meaning through the L2 only, replicating the present

study with such means of verifying meaning in order to determine whether the results persist. (*The modern Language Journal*, 84, 2000, 214-224)

(26) The evidence cited **has implications for SLA theories**, as it offers another alternative to the view that providing input, whether explicitly or implicitly, constitutes the main method of language acquisition ... . (*System* 41, 2013, 443-461)

(27) The results may **have practical teaching implications**, as well. First, classroom instruction could with relative ease create opportunities for language students to experience learning in a communicative setting where the emphasis is explicitly on meaningful interaction (Long, 1996) and implicitly on form. (*The Modern Language Journal*, 84, 2001, 226-243)

(28) **The pedagogical implications of these findings** suggest that positive goal and positive resource interdependence should be structured among learners to promote cross and multicultural understanding and appreciation; whereas, teacher and peer personal support should be provided in order to decrease feelings of alienation among learners, thereby enabling them to persist and complete their academic programs. (*System*, 35, 2007, 229-240)

(29) This specific finding **has implications for CAI materials development** and its perhaps excessive focus on developing the right feedback to the detriment of quality practice. (*Language Learning*, 54, 2004, 35-78)

### 3.2. Results of Move Analysis of Chemistry RADs

The frequency of the occurrence of the moves and steps realizing them in the chemistry RADs is shown in Table 2:

Table 2. Frequency of Occurrence of Moves and Steps Realizing Them in Chemistry RADs

Moves and Steps realizing Them in RADs	Frequency of Occurrence				Total (Out of 52)	Percent
	JPS (Out of 13)	ECC (Out of 13)	ECA (Out of 13)	ACBE (Out of 13)		
M1	5	6	6	5	22	42.30%
M2	1	0	0	0	1	1.92%
M3	13	13	13	13	52	100%
M4	13	13	13	13	52	100%
Step A	12	13	13	13	51	98.07%
Ai)	10	11	13	12	46	88.46%
Aii)	6	9	9	8	32	61.53%

Aiii)	1	1	0	1	3	5.76%
Step B	4	9	6	7	26	50%
Step C	8	4	3	3	18	34.61%
Ci)	8	3	1	3	15	28.84%
Cii)	0	0	0	0	0	0%
Ciii)	2	3	1	3	9	17.30%
(M5)	1	0	0	0	1	1.92%
(M6)	3	2	0	1	6	11.53%

As Table 2 suggests, M1 ('background information') was found to be used by less than half of the chemistry authors (42.30%). Excerpts 30 and 31 show how M1 was utilized by the chemistry authors at the opening paragraph of the Discussion sections to remind readers of the research purpose, research questions, and/or research methodology:

(30) **The main goal of our study is to** electrochemically prepare silver nanostructured materials by growth of the metal in the presence of strongly absorbing molecules—thiols. (*Electrochemistry Communications*, 6, 2004, 400-403)

(31) **To explore the effects of** molecular gas adsorption on Li (bcc) substrates, **we considered** three Li (bcc) surfaces with different surface-energy [68]. (*Journal of Power Sources*, 296, 2015, 150-161)

M2 ('summarizing results') was observed in only one of the RAs analyzed, so was M5 ('evaluating the study'). M3 ('reporting a result') and M4 ('commenting on (the) result'), which are the obligatory moves in Basturkmen's (2009, 2012) framework, were found to be also obligatory in chemistry RADs. Excerpt 32 indicates how M3 is realized by the chemistry authors:

(32) **The results indicated that** there was no strongly adsorbed species formed on the surface of Pd–NiO/C electrocatalyst to block the active sites for ethanol oxidation. (*Electrochimica Acta*, 52, 2006, 1087-1091)

It should be noted that the Results-Comments Sequences (Basturkmen, 2009) were observed in only a few of the RAs, probably due to the fact that in chemistry, one single experiment is usually carried out which will commonly lead to one single outcome. M4 was realized by Step A (98.07%), 'explaining the result' (see excerpts 33, 34, 35, and 36), and Step B (50%), 'comparing the result with results reported in previous studies in the literature' (see excerpts 37, 38, 39, and 40), and Step C (34.61%), 'evaluating the result' (see excerpt 41):

(33) The drastic increase in the potential at 12mAcm<sup>-2</sup> on Pd–NiO/C electrocatalyst **is most probably due to** the concentration polarization of ethanol. (*Electrochimica Acta*, 52, 2006, 1087-1091)



(34) The sluggish kinetics of interfacial reaction and increased diffusion current for zinc in the SDBS containing electrolyte seem to be conflict, but **this could be explained by** the formation of a loose and porous passive film on the zinc surface in the existence of SDBS. (*Journal of Power Sources*, 128, 2004, 97-101)

(35) **For the majority of** metal nanoparticles **reported in the literature** the dominant surfaces are (1 1 1) planes **due to** their highest thermodynamic stability [34]. **Following this lines** [*mistake original*] we could suggest that silver nanorods and nanoflakes are bounded by (1 1 1) facets and the growth occurs at (1 1 0) and (1 0 0) walls. (*Electrochemistry Communications*, 6, 2004, 400-403)

(36) Three sets of peaks can be seen at 210 mV, 100 mV, and 35 mV. These peaks **can be attributed to** three successive electrochemical processes as shown in the following [17,18]. (*Electrochemistry Communications*, 8, 2006, 1179-1184)

(37) During anodic sweep, two anodic current peaks appear at -1.1 and -1.0V for zinc anode in blank solution, **which is similar to those previously reported** in [15, 16]. (*Journal of Power Sources*, 128, 2004, 97-101)

(38) The high frequency semicircle observed in this work **is analogous to** that reported previously and has been already assigned to the charge transfer behavior of zinc electrode in literature [17]. (*Journal of Power Sources*, 128, 2004, 97-101)

(39) **These results are consistent with those from previous studies** on (carbon-supported) Pt and bimetallic Pt-based electrodes in acid media [16,28,59–61]. The similar behavior of the Tafel plots of the two catalysts suggested that the reaction pathway and the rate-determining step are the same on both catalysts. (*Electrochimica Acta*, 55, 2010, 4506-4511)

(40) Conductivity values upon first heating are **consistent with those reported by** Wright's group of  $\sim 10^{-4}$  S/cm at 110 °C for polymer I:LiClO<sub>4</sub> electrolytes with an EO:Li ratio 5:1[12,13]. Conductivity data upon subsequent cooling were **not reported in these previous studies**. (*Electrochimica Acta*, 52, 2007, 1983-1989)

(41) The above all being stated, **the main point of this paper**, in the Author's opinion, **is to introduce** a potentially interesting alternative aluminum anode structure, rather than focusing too closely on details of the present test electrodes. **The general results of the test data**, of course, **are**

**necessary for** proof of concept. (*Journal of Power Sources*, 130, 2004, 309-314)

Finally, as shown in Table 2, M6 ('implications for further research') was found to be used less frequently (11.53%) in chemistry.

### 3.3. Comparing and Contrasting Results of Move Analyses of Applied Linguistics and Chemistry RADs

In order to investigate the disciplinary variation in the move structure of the Discussion sections in the two disciplines, chi-square analyses were run, the results of which are presented in Table 3:

Table 3. *Chi-Square Analysis Comparing Move Structure of ALs and Chemistry RADs*

Moves and Steps in RAs	Percentage		Chi-Square Analysis		
	ALs	Chemistry		<i>p</i> Value	Cramer's V Value
M1	44.23%	42.30%	.03	.84	.01
M2	46.15%	1.92%	27.85	.00	.51
M3	100%	100%	-	-	-
M4	100%	100%	-	-	-
Step A	100%	98.07%	1.01	.31	.09
Ai	75%	88.46%	3.15	.07	.17
Aii	50%	61.53%	1.40	.23	.11
Aiii	9.61%	5.76%	.54	.46	.07
Step B	96.15%	50%	28.15	.00	.52
Step C	25%	34.61%	1.14	.28	.10
Ci	13.46%	28.84%	3.69	.05	.18
Cii	1.92%	0%	1.01	.31	.09
Ciii	13.46%	17.30%	.29	.58	.05
M5	28.84%	1.92%	14.47	.00	.37
M6	50%	11.53%	18.05	.00	.41
Total			17.86	.00	.40

As shown in Table 3, similar results were obtained for M1 ('background information') in the two disciplines. That is, despite the fact that this move is not obligatory, approximately half of the authors in both disciplines tended to start the Discussion section by providing readers with some background information. As indicated in the excerpts 1, 2, 30, and 31 above, authors mainly used phrases containing nouns such as *goal*, *purpose*, and *aim* or sentences containing verbs such as *address*, *test*, *focus*, *design*, *examine*, *conduct*, *investigate*, *explore*, and *compare* in both active and passive voices and in both present and past tenses (e.g., *This study was conducted to investigate ...*) to realize the move. It is worth mentioning that the distribution of this move was not balanced in the corpus analyzed in ALs. Whereas

most (10 out of 13) of the RAs in *System* included this move, only two occurrences were observed in *MLJ*, suggesting some internal generic conventions in some journals within the same discipline.

Likewise, M3 ('reporting a result') and M4 ('commenting on (the) result') were found to be obligatory moves in both disciplines and were employed by all the authors. As is evident in excerpts 5, 6, 7, and 32 above, we found that authors in both disciplines often utilized verbs such as *show*, *indicate*, and *reveal* to report their results. Such phrases as *A central finding of the study is ...*, *In this study, we found that...*, and *Our main finding is that...* are also examples of how M3 is realized. In relation to M4, it was found that all the authors in ALs and almost all in chemistry commented on their results by explaining them in various ways included in Step A. They either 'provided an explanation using their common sense' (i.e., Step Ai) or 'referred to an explanation provided in the literature' (i.e., Step Aii) to justify the results. Excerpts 8, 9, 10, 33, 34, 35, and 36 show how the authors use their common sense to provide explanations for their findings using discourse markers showing reason as in *... is probably due to, the reason may be that, ... may be responsible for, There are several explanations ..., it could be that ..., It is quite possible that ..., and could be explained by ...*. Another interesting point observed regarding the use of discourse markers in the explanation of results was that the majority of the authors used *hedging* when they justified their results employing lexical items such as *likely, may, might, probably, and possible*. However, as is evident in excerpts 11, 12, 37, 38, 39, and 40, the authors in both disciplines sometimes referred to an explanation provided in the literature to justify their results.

However, the chi-square analysis found significant disciplinary variations between the ALs and chemistry RADs, specifically in the use of M2 ('summarizing results';  $p = .00$ ,  $V = .51$ ). Whereas this move featured in almost half of the RADs in ALs, it occurred only once in those of chemistry. Moreover, a significant difference between the RADs in the two disciplines was observed in the use of Step B of M4 ('comparing with result in literature'; ( $p = .00$ ,  $V = .52$ ). In fact, whereas it seemed obligatory for the ALs researchers to compare their results with those reported in the literature (96.15%), it was an optional practice for the chemistry authors and was used in half of the RADs (50%). The two disciplines also showed variations in the use of substep ci of Step C of M4 ('importance of the result';  $p = .05$ ,  $V = .18$ ). In fact, the chemistry authors emphasized the importance of their findings (28.84%) twice as much as the ALs authors did (13.46%).

We also found significant disciplinary variations between the ALs and chemistry RADs in the use of M5 ('evaluating the study';  $p = .00$ ,  $V = .37$ ), which authors generally use to evaluate their studies (i.e., 'mention a merit or limitation'). Whereas this move seemed to be optional, but common, in ALs RADs, they were

rarely, if ever, used in the chemistry RADs. As displayed in excerpts 17, 18, 19, and 20, the ALs authors made use of such verb phrases as *is unique*, *add to the literature*, and *may be added to the wealth of related studies* to mention a merit of their studies. On the other hand, as shown in excerpts 21 and 22, the ALs authors used noun phrases such as *several limitations*, *one obvious weakness*, and *a potential weakness* to refer to a limitation in their work.

The chi-square analysis also found significant disciplinary variations between the ALs and chemistry RADs in the use of M6 ('implications for further research and pedagogic implications';  $p = .00$ ,  $V = .41$ ). As indicated in excerpts 23, 24, and 25, the ALs authors used either the noun phrase *future research* followed by such phrases as *should replicate this study* and *should target ...* or a noun phrase mentioning the topic under investigation followed by a passive verb phrase such as *needs to be further investigated* to suggest future research directions. Moreover, as shown in excerpts 26, 27, and 29, they mostly utilized such verb phrases as *has implications for ...* and *have practical teaching implications* to offer pedagogical implications for their research.

### 3.4. Results of Interviews With Applied Linguistics and Chemistry Experts

In order to get a fuller understanding of the results and explain why the differences existed across the two disciplines and, thus, to answer the second research question of the study, a number of semistructured interviews were conducted with both chemistry experts (CEs) and applied linguistics experts (ALEs). The interviews included a number of domain-specific questions, requiring the experts to explain why some moves/steps occur more frequently in one discipline (e.g., ALs) and are less likely to be used in another (e.g., chemistry) and clarify some deductions we had made based on the analyses of the quantitative data. The results of the content analysis of the responses provided by both CEs and ALEs are presented in Table 4:

Table 4. Results of Content Analysis of Responses to Domain-Specific Questions

Experts	Interview Questions and Responses			
	1- What is the most challenging section of an RA in terms of writing?			
	Introduction		Results	Discussion
CEs	2(25%)		1(12.5%)	5(62.5%)
ALEs	1(12.5%)		1(12.5%)	6(75%)
	2- What are the most important moves that should be included in RADs?			
	M1	M3	M4	M6
CEs	3(37.5%)	8(100%)	8(100%)	1(12.5%)
ALEs	4(50%)	8(100%)	8(100%)	5(62.5%)
	3- How important is 'summarizing the results' in RADs?			

	Very Important	Important	Not Very Important	Not Important at All		
CEs	0(0%)	1(12.5%)	4(50%)	3(37.5%)		
ALEs	2(25%)	4(50%)	2(25%)	0(0%)		
<i>4- How important is comparing the results with those previously found in the literature?</i>						
	Very Important	Important	Not Very Important	Not Important at All		
CEs	2(25%)	3(37.5%)	3(37.5%)	0(0%)		
ALEs	2(25%)	5(62.5%)	1(12.5%)	0(0%)		
<i>5- What do you think of 'evaluating the study' by authors in their RADs?</i>						
	Evaluation should be left to readers.	Evaluation is done only if the work is novel and contributes remarkably to the knowledge base.	Readers must be informed of the merits and limitations of the study.	It should be mentioned in the Introduction section.	It should be mentioned in the Conclusion section.	Readers must be informed of how the results add to the related knowledge base.
CEs	3(37.5%)	2(25%)	1(12.5%)	1(12.5%)	1(12.5%)	0(0%)
ALEs	0(0%)	0(0%)	3(37.5%)	1(12.5%)	1(12.5%)	3(37.5%)
<i>6- What do you think of the inclusion of 'implications for further research' in RADs?</i>						
	Researchers prefer to continue the line of research themselves.	Authors should inform prospective researchers of the limitations that need to be eliminated in future research.	This move is usually used in theses and dissertations.	Research in an area must be continued until a clearer picture of the phenomenon under investigation be presented.	This move is usually used in the Conclusion section.	
CEs	3(37.5%)	1(12.5%)	3(37.5%)	0(0%)	1(12.5%)	
ALEs	0(0%)	4(50%)	1(12.5%)	2(25%)	1(12.5%)	

As shown in Table 4, regarding question # 1, the experts in both disciplines argued that the Discussion and the Introduction sections, particularly the former, are the most challenging sections of an RA in terms of writing. The majority maintained that it is probably because in the Discussion section, researchers are required to present and discuss their findings and persuade the reader that their work actually adds to what is already known.

In relation to question # 2, M3 and M4 were reported by all the experts in both disciplines as obligatory moves expected to be included in RADs, which corroborates the results of the quantitative data analysis. Another important move was found to be M1, mentioned by 37.5% of the CEs and 50% of the ALEs. Confirming the results of the quantitative data analysis, the experts interviewed asserted that authors often use this move to remind readers of the research purpose, research questions, and/or research methodology before presenting and discussing

the results. However, M6 was mentioned only by ALEs (62.5%) as essential in realizing the aims of RADs (see the paragraph discussing Question 6 for further detail).

In relation to question # 3, the majority (87.5%) of the CEs asserted that the use of M2 in RADs is unnecessary. As one of the CEs stated, in chemistry, authors often seek answers to a single question which generally yields a single result. He maintained that chemistry writers often do not see the need to repeat what they have already reported in the Results sections of their RAs, which might be the reason why only one of the chemistry RAs analyzed contained this move. On the other hand, almost half of the ALs RAs analyzed in this study included this move in their Discussion sections. Also, 75% of the ALEs interviewed emphasized the importance of using M3 in RADs. In this regard, as one of the ALEs argued, because in humanism, in general, and ALs, in particular, researchers often seek to find answers to more than one research question (probably due to the variable and extensive nature of human behavior), the findings are naturally multiple and various. As a result, summarizing the results in the Discussion section is likely to contribute to better comprehensibility of the discussions. However, as another ALE asserted, when space limitations do not allow the author(s) to provide such information, no harm will be done to the value of the work.

The responses to question # 4 helped us understand why the chemistry authors tended 'to compare their results with those of previous studies' (i.e., M4, Step B) less frequently (50%) than their ALs counterparts (96.15%). As one of the CEs asserted, comparison is not a necessity in chemistry RADs and it is considered as an optional rhetorical step' probably because most chemistry RAs report the results of an almost novel experiment which has not been conducted before. However, most CEs maintained that it is important to compare the results with those obtained in previous studies if one intends to show the advantage of their findings over previous ones. On the other hand, most ALEs argued that because researchers in humanities study human behavior and attributes, each time from a different perspective usually obtaining various and sometimes contradictory results, they are obliged to compare and contrast their findings with those in the literature in order to support their claims.

The results of our genre analysis of the RADs in chemistry and ALs revealed that the chemistry authors displayed much less tendency (1.92%) 'to evaluate their study' (M5) than their ALs counterparts (28.84%). Because it was important for us to understand why this disciplinary variation existed, we again referred to the interviews conducted with the experts to consider their responses to question # 5. Three of the experts asserted that researchers should not judge the value of their research themselves and that they should leave this to readers. Two of

the CEs and two of the ALEs believed researchers do not use M5 in RADs, and that they might evaluate their studies either in the Introduction or Conclusion section. However, two of the CEs asserted that they focus on the value of their study in RADs only if their work is novel and contributes remarkably to the knowledge of issues in the field. On the other hand, most ALEs considered it essential that the readers be informed of the merits and limitations of the study and that they be informed of how the results of the work add to the knowledge base in their field.

Finally, regarding the element ‘suggestions for further research’ (question # 6), the results of the quantitative data analysis showed that the chemistry authors tended to use it less frequently than the ALs researchers did. In this regard, some of the CEs interviewed maintained that it is not common for chemistry authors to make suggestions to others for further research because chemistry researchers commonly continue the given line of research themselves. As a result, as the CEs explained, they tend to use sentences such as ‘the issue is still under investigation’ to tell the readers that they intend to continue the line of research themselves. One of the CEs and one of ALEs reported that further research might be suggested in the Conclusion section of RAs. Also, three of the CEs and one of the ALEs believed that this element is more common in writing theses and dissertations than RAs. However, most ALEs believed that authors, sometimes, use this move to inform prospective researchers of the limitations that need to be eliminated in future research. As two of the ALEs argued, unlike pure sciences, social sciences do not deal with absolute facts, so research in a particular area must be continued until a clearer picture of the phenomenon under investigation is presented.

#### **4. Discussion**

Combining both quantitative and qualitative methods of data collection and analysis, this genre-based study investigated the cross-disciplinary variations in the generic structure of the Discussion sections of 52 ALs and 52 chemistry RAs, drawing upon Basturkmen’s (2009, 2012) framework and taking into account the new insights proposed by recent related research and the suggestions and findings of Bhatia (2004), Lim (2012), and Shehzad (2008). The results of the interviews revealed that the most challenging section of an RA in terms of writing is the Discussion section. As the expert informants interviewed in this study maintained, this is probably because in RADs researchers are required to present and discuss their findings and persuade the reader that their work adds to what is already known. This argument is, in fact, consistent with that of the idea that the Discussion section is the place where researchers strive to support their claims (Basturkmen, 2012; Kanoksilapatham, 2010), and that it is the effectiveness of this section that determines the extent to which an RA has been successful in attracting readers and meeting the expectations of the research community (Kanoksilapatham, 2010).

As shown above, significant generic differences were observed in the structure of the RADs in ALs and chemistry. In fact, the differences were seen mainly in the optional moves (i.e., M2, M5, and M6). Regarding M1 ('background information'); rather, similar results were obtained in the two disciplines. As the results indicated, authors often use M1 to remind readers of the research purpose, research questions, and/or research methodology before presenting and discussing the results. This move was also observed in half of the RAs in social sciences analyzed by Holmes (1997) and more than half of the RAs in dentistry analyzed by Basturkmen (2012), suggesting that authors in various disciplines often make use of this move in the opening paragraphs of their RADs.

With regard to M2 ('summarizing results'), a significant difference was observed between the two disciplines. Whereas this move featured in almost half of the RADs in ALs, it occurred only once in those of chemistry. Likewise, Basturkmen (2012) showed that 'summarizing results' did not occur frequently in the dentistry RADs. This difference might be due to the fact that in ALs, as the expert informants argued, authors often aim to answer several research questions in a single study; thus, they integrate their findings to give a general overview of the results. On the other hand, in chemistry, authors often seek answers to a single question which generally yields a single result. Therefore, they often do not see the need to repeat what they have already reported in the Results section.

The results obtained for M3 revealed that all the chemistry and ALs RAs analyzed included 'reporting a result,' which indicates that this move is obligatory in both disciplines. Also, several studies (e.g., Basturkmen, 2009, 2012; Hopkins & Dudley-Evans, 1988; Stoller & Robinson, 2013) found the centrality of this move in RADs in various disciplines, which was also corroborated by the findings of the present study. Another obligatory move which occurred in all of the RADs in both disciplines was M4 ('commenting on results'). In fact, as also highlighted by Basturkmen (2009), the Result-Comment Sequence was found to be a common feature of the RADs in both disciplines, specifically in ALs. This finding seems to be in line with the results of most of the studies conducted in this regard (e.g., Basturkmen, 2009, 2012; Stoller & Robinson, 2013; Yang & Allison, 2003). In fact, this move appears to be essential because it allows the authors to build arguments and confirm the soundness of their claims (Basturkmen, 2009). All the authors in ALs and almost all in chemistry commented on their results by either providing an explanation using their common sense or referring to an explanation provided in the literature to justify the results.

One area in which the chemistry RADs differed significantly from their counterparts in ALs was the frequency with which they compared their results with those obtained by previous researchers (i.e., M4, Step B). As observed, almost all



the ALs RAs compared their results with those reported by previous researchers, whereas this step seemed to be optional in chemistry as it occurred in nearly half of the articles analyzed. The results of Basturkmen's (2009) study also showed that, in nearly half of the RADs in ALs, the authors compared their results with those reported in the literature. Therefore, it can be concluded that 'comparing the findings of a study with the results of similar studies in literature' might be a generic convention in ALs. As argued by the expert informants, most chemistry articles report the results of almost novel experiments which have not been conducted before. On the other hand, most ALEs argued that because researchers in humanities, in general, and ALs, in particular, study human behavior and attributes achieving various and sometimes contradictory results, they are bound to compare and contrast their results with those in the literature in order to support their position.

Furthermore, the authors in both ALs and chemistry rarely evaluated the results obtained. In other words, they did not frequently apply Step C of M4 ('evaluating the result'). Among the three substeps proposed for this step, discussing the importance of the study occurred more frequently than the other two in both ALs and chemistry. The results of the study indicated that the ALs authors used this step to persuade the readers that a specific result obtained in their study was essential to prove a concept or theory or to be used by a particular group (e.g., teachers, curriculum designers, teacher trainers, etc.) to improve their performance or effectiveness. In fact, most ALEs considered it essential that the readers be informed of the merits and limitations of the study and that they be informed of how the results of the work contribute to the already-existing knowledge base in their field. Nevertheless, the CEs believed it is the readers who should judge the value of the research done and not the authors themselves.

The two disciplines also showed significant differences regarding M5 ('evaluating the study'), which authors generally use to evaluate their studies (i.e., 'mention a merit or limitation') and M6 in which the authors discuss the implications and make suggestions for future research. Whereas these moves seemed to be optional but common in the ALs RADs, they were rarely, if ever, used in the chemistry RADs. This finding is in line with that of Lim (2010) in which only 2 out of 15 the RAs in ALs and none of the RAs in education made 'recommendations for future research.' On the contrary, Basturkmen (2012) found that 70% of the RADs in dentistry included this move. Similarly, Holmes' (1997) genre analysis of the RAs in social sciences showed that the majority of the authors (17 out of 30) included this move in their Discussion sections. Furthermore, our findings in relation to the use of M5 and M6 by the ALs authors are in contrast with those of Basturkmen (2009) who reported no instances of the moves in the ALs RAs

she analyzed. However, the finding for M6 confirms Yang and Alison's (2003) assertion that in RAs where there are no Conclusion and Pedagogical Implications sections, the element 'drawing pedagogical implications' occurs in the Discussion section and that the frequency of occurrence of the moves depends on the organizational structure of the article. Supporting Yang and Alison's (2003) assertion, some of the expert informants emphasized that this move might occur in the Conclusion section of RAs. Others believed that this element is more common in writing theses and dissertations than RAs. As the ALs experts argued, unlike pure sciences, social sciences do not deal with absolute facts. Thus, research in a particular area must be continued until a clearer picture of the phenomenon under investigation be presented; accordingly, authors sometimes use this move to inform prospective researchers of the limitations that need to be eliminated in future research.

### **5. Conclusion and Implications**

In this genre study, we concluded that Basturkmen's (2009, 2012) framework is successful not only in describing the overall framework of the Discussion sections of RAs in both disciplines, but also in the detailed definition and description of the individual steps and substeps realizing the moves. Another conclusion was that the use of the qualitative data (e.g., obtained via interviewing expert informants in a particular discipline) can be not only a support for the results obtained through the quantitative genre analysis of the RAs, but also a way of understanding and accounting for why authors in a given discipline might use a specific move/step more than others or why a move/step is frequently used by authors in one discipline but is totally absent in another. It was also concluded that variation in the generic structures of various disciplines might not be identified by merely comparing the moves alone, but meticulous analysis of steps and substeps as well as their combination also needs to be conducted and considered. Accordingly, we might be able to argue that the general structure of the Discussion section appears to be almost the same in such various disciplines as chemistry and ALs; however, the analyses of the details (i.e., steps and substeps realizing the moves) and the results of the interviews revealed that each discipline has its own way of organizing and emphasizing details within the general framework of RADs. These differences might be attributed not only to the different natures of the two disciplines but also to different requirements and expectations of their academic communities.

The present study might yield a number of implications: One implication might be directed to postgraduate students and novice researchers in the disciplines of chemistry and ALs who wish to share their research findings internationally with their discourse community. It is, thus, deemed mandatory that postgraduate students

and novice researchers get acquainted with the RA genre, rhetorical moves, and steps commonly used by authors in their fields to better realize the purpose of each section of RAs, particularly the Discussion section which is perceived by the scholars to be rhetorically complex and challenging to write. Accordingly, they are recommended to get thoroughly familiar with the conventions of writing in their disciplines as well as the expectations of the discourse community to which they belong and pay attention to the genre and move structure delicacies specific to their discipline.

To be more precise, it seems essential that novice researchers in both ALs and chemistry be trained to report a result of their study and comment on it by referring to an explanation provided in the literature or providing alternative explanations for the same result. Moreover, the cross-disciplinary variations should be highlighted for the novice researchers, in particular, to get acquainted with the genre and move structure features unique to their discipline if they expect to readily share their research findings with an international community. For instance, novice researchers in both disciplines, particularly ALs researchers, are recommended to summarize their results in the Discussion section in order to remind the reader of their findings and, in turn, contribute to better comprehensibility of their discussions, although sometimes space limitations do not allow the author(s) to provide such information. In addition, based on the results of the present study, comparing the results with those reported in the literature appears to be vital mainly for ALs researchers if they want to support their claims and persuade the reader that their research has been carried out based on an extensive review of the related literature and that their findings add to what is already known.

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### **References**

- Basturkmen, H. (2009). Commenting on results in published research articles and masters dissertations in language Teaching. *Journal of English for Academic Purposes*, 8, 241-251.
- Basturkmen, H. (2012). A genre-based investigation of discussion sections of research articles in Dentistry and disciplinary variation. *Journal of English for Academic Purposes*, 11, 134-144.

- Bhatia, V. K. (2004). *Worlds of written discourse: A genre-based view*. Cornwall, UK: Continuum International Publishing Group Ltd.
- Curry, M. J., & Lillis, T. (2004). Multilingual scholars and the imperative to publish in English: Negotiating interests, demands, and rewards. *TESOL Quarterly*, 38, 663-688.
- Dudley-Evans, T. (1994). Genre analysis: A key to a theory of ESP? *Ibérica*, 4, 3-19.
- Fallahi, M. M., & Erzi, M. (2003). Genre analysis in language teaching: An investigation of the structure of the discussion section of language-teaching-journal articles. *Iranian Journal of Applied Linguistics*, 6(1), 69-81.
- 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, 321-337.
- Hopkins, A., & Dudley-Evans, T. (1988). A genre-based investigation of the Discussion section in articles and dissertations. *English for Specific Purposes*, 7, 113-121.
- Huang, J. C. (2010). Publishing and learning writing for publication in English: Perspectives of NNES Ph.D. students in science. *Journal of English for Academic Purposes*, 9, 33-44.
- Hyland, K. (2006). *English for academic purposes: An advanced resource book*. London: Routledge.
- Kanoksilapatham, B. (2012). In search of the generic identity of the discussion section: Three engineering subdisciplines. *Taiwan International ESP Journal*, 4(2), 1-26.
- Li, Y. Y. (2002). Writing for international publication: the perception of Chinese doctoral researchers. *Asian Journal of English Language Teaching*, 12, 179-193.
- Li, Y. Y. (2007). Apprentice scholarly writing in a community of practice: An interview of an NNES graduate student writing a research article. *TESOL Quarterly*, 41(1), 55-79.
- Lim, J. M. (2010). Commenting on research results in applied linguistics and education: A comparative genre-based investigation. *Journal of English for Academic Purposes*, 9, 280-294.
- Lim, J. M. (2012). How do writers establish research niches? A genre-based investigation into management researchers' rhetorical steps and linguistic mechanisms. *Journal of English for Academic Purposes*, 11, 229-245.

- Martín, P., Rey-Rocha, J., Burgess, S., & Moreno, A. I. (2014). Publishing research in English-language journals: Attitudes, strategies, and difficulties of multilingual scholars of medicine. *Journal of English for Academic Purposes*, 16, 57-67.
- Shehzad, W. (2008). Move two: Establishing a niche. *IBÉRICA*, 15, 25-50.
- Stoller, F. L., & Robinson, M. S. (2013). Chemistry journal articles: An interdisciplinary approach to move analysis with pedagogical aims. *English for Specific Purposes*, 32, 45-57.
- Swales, J. M. (1981). *Aspects of article introductions*. Birmingham, UK: The University of Aston, Language Studies Unit.
- Swales, J. M. (1990). *Genre analysis*. Cambridge: Cambridge University Press.
- Swales, J. M. (2004). *Research genres: Explorations and applications*. Cambridge: Cambridge University Press.
- Uzuner, S. (2008). Multilingual scholars' participation in core/global academic communities: A literature review. *English for Academic Purposes*, 7, 250-263.
- Yang, R. & Allison, D. (2003). Research articles in applied linguistics: Moving from results to conclusions. *English for Specific Purposes*, 22, 365-385.