Textuality in EAP Research Articles: A Genre Analysis[1]

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Abstract

One of the main concerns of scholars working in the field of EAP over the last 2 decades has been raising the awareness of EAP students and publishers of genre conventions in academic journals. In line with the above concern, many studies have aimed at exploring the general characteristics of research articles (RAs) in the field. Among these features, it seems that the generic moves and textuality have drawn the attention of researchers. Therefore, the purpose of this study was twofold: (1) to compare and contrast the Iranian local ESP journals with their international counterparts in terms of the given features by drawing upon existing research, and (2) to develop a more inclusive model for the analysis of moves and lexical cohesion patterns (LCPs) in the Discussion sections of ESP RAs. Results showed that the Discussion sections in the international ESP RAs tended to have a more cyclical evaluative move mechanism compared with their Iranian local counterparts. Findings also revealed that the organizational patterning and use of the LCPs in consolidating the Results sections of the RAs have a dual intrinsic relationship. Translation of such findings provides a better chance for nonnative EAP writers to publish in international journals.

Keywords: Move Analysis; Organizational Patterning; Lexical Cohesion Patterns (LCPs); EAP Articles

1. Introduction

A host of research has been done on the organizational patterning of academic RAs in the past few decades (e.g., Hirano, 2009; Hopkins & Dudley-Evans, 1988; 2004; Kanoksilapatham, 2005, 2007; Nwogu, 1991, 1997; Swales, 1990, Tahririan & Jalilifar, 2004). These studies "discuss the global features, that is, the rhetorical components or 'moves' of different sections of RAs, along with some of their associated rhetorical and linguistic features" (Bonn & Swales, 2007, p. 94) such as modality, first person pronoun, hedging, and so on. Flowerdew and Wan

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(2009) suggest that the underpinning motivation for genre analysis for the researchers was the goal of developing pedagogic materials for nonnative speakers (NNSs) of English. Yang and Allison (2003) justify the increase of attention to the analysis of organizational patterning by echoing its importance for the pedagogic purposes in many contexts. Similarly, Bhatia (2002) emphasizes that, "whatever the focus of generic research may be, it cannot afford to undermine the complex and dynamic realities of the world of discourse. It is more convenient to focus on generic descriptions suitable for the language classroom" (p. 5).

The importance of the evaluation of generic structure, that is, move analysis of RAs, has been emphasized by many scholars such as Flowerdew and Wan (2009). They believe that move analysis is very important for pedagogical purposes and teaching writing ability. Kwan (2006) argues that to identify the move structure of a genre, the analyst needs to know the function of the text group and to determine the contribution of move to the fulfillment of that function. The identification of moves and steps, as Yang and Allison (2003) note, enables the categorization of chunks of discourse based on their primary communicative purposes. The concept of *move* "captures the function and purpose of a segment of text at a more general level, while Step spells out more specifically the rhetorical means of realizing the function of Move" (Yang & Allison, 2003, p. 370); in fact, "the set of Steps for a Move is the set of rhetorical choices most commonly available to RA authors to realize a certain purpose" (p. 370). Therefore, it can be implied that the most highlighted contributions of move analysis to the researchers, particularly novices, are (1) familiarizing them with the standard and permissible structure of academic writing and (2) diagnosing the appropriateness of writing for each social situation. Burrough-Boenisch (2003) states that NNSs of English who aspire to be members of the international academic discourse community should be sensitized to the standard conventions acceptable in different manuals. Similarly, Flowerdew and Wan (2009) notes that writers "besides having a proficient grasp of the English language, which the reports are written in, need to be able to read the social situations that indicate what kind of writing is appropriate" (p. 13). Flowerdew (2001) stresses that one of the main problems that NNSs have, in comparison to the native speakers (NSs), is the inappropriate structure of Discussion sections of their research articles (RAs).

In the Iranian context, a considerable amount of research has been done on the generic structure of RAs (Fallahi & Erzi, 2003; Habibi, 2008; Fallahi Moghimi & Mobasher, 2007; Tahririan & Jalilifar, 2004). However, the studies on raising the students' awareness of genre conventions in academic centers of the Iranian context are far from being adequate (Jalilifar, Hayati, & Namdari, 2012; Salahshoor, 1999). Keshavarz, Atai and Barzegar (2007) have considered this lack of genre awareness among Iranian writers/researches as one of the main barriers in their academic

communication which have led to the deprivation of some Iranian researchers from active participation in published academic discourse. They suggest that, in order to fill this gap, and to contribute the writers/researchers to participate actively in academic communication, "an explicit description of the way in which academic texts are organized will be helpful for the prospective member/researcher of this discourse community" (Keshavarz et al., 2007, p. 17).

Whereas genre studies have provided us with a preliminary understanding of the generic structure of RAs, they have not analyzed the plausible variations that exist in the Discussion sections of ESP RAs. Swales (1990) and Hyland (1999) note that rhetorical structures vary according to academic disciplines. Samraj (2002) suggests that even between related genres such as Wildlife Behavior and Conservation Biology we can find structural variation. However, the variations regarding the structure of the Discussion section of the ESP RAs have not been duly attended to. Therefore, this study reports on a study of ESP RAs from a cross-disciplinary perspective using textual data. The findings from such a study can be utilized in EAP courses to facilitate the production of this genre by the students, researchers, and nonnative writers (Samraj, 2008). Also, Fallahi Moghimi and Mobasher (2007) believe that genre analysis has the merits of providing students with beneficial frameworks within which they can progress their writing ability.

The second outstanding gap in previous genre studies which seems to have been neglected by genre analysts is the lexical cohesion patterns (LCPs) manipulated within the identified moves of different sections of RAs. LCPs are rigorous devices used to form semantically strong relations between sentences of a text (Hoey,1991). The importance of lexical cohesion and cohesive devices in written and spoken discourse has been widely emphasized by many researchers (Bublitz, 1996; Fankhauser, 2005; Hoey, 1991; Johnstone, 1987; Klebanov & Shamir, 2007; Teich & Sardinha, 1997). Among these, Hoey's (1991) LCPs model has received the most attention. In his LCPs model, Hoey (1991) has classified lexical cohesive relationships under the head of repetition. His proposed model consists of eight categories which are ranked in decreasing order of importance. These categories are simple lexical repetition (SR), complex lexical repetition (CR), simple mutual paraphrase (SMP), simple partial paraphrase (SPP), antonymous complex paraphrase (ACP), superordinate (SUP), hyponymy (H), and coreference (CR). He states that the most important factor in coherence of a text is repetition of words along the whole text. Repetition of words also helps researchers not to lose their way and do their best to just develop the aimed topic. Hoey (1991) defines SR as the repetition of items which are formally identical and CR as the repetition of items which are not formally identical. From his point of view, items with the identical lexical morphemes but with different grammatical functions are classified

as CR and items sharing the same morphemes with minimum alternations such as plural nouns, verbs making 3rd person singular, simple past and past participle, as well as gerund verbs are labeled as SR. The second category of repetition, synonymy, involves the simple or partial paraphrase of the idea represented by a given lexical item, rather than its form. Simple paraphrase is the substitution of lexical items in different contexts without any change in meaning. On the other hand, partial paraphrase is the substitution of lexical items that are derived from two different word classes. Instances of both are *sedating, drugging and sedating tranquilized*, respectively. Antonym, as the third category of repetition, involves the repetition of the concept of a given item by means of an antonymous term which is either part of the same or different word class. Examples of ACP can be *violent, peaceable*, or *cause and effect*, and also *happy, unhappy*. Superordinate and hyponymic, as the other categories of repetition, account for cases when two items are interpreted as having identical referents. Superordinate repetition involves a general term which may be said to designate a relationship with another word, where the first word is a member of the latter one, *antibiotic* and *drug* as an example. Conversely, Hyponymic repetition involves a specific term which is said to be the member of the earlier item forming the link, for example, *animal* and *bear*. In common with superordinate and hyponymic repetition, coreference, as a context-dependent link, involves items sharing the same referent. An example of a coreference is *weed seed*: *food resource*.

Most studies that have already investigated the role of lexical cohesion, in general, and LCPs, in particular, focused on the different types of texts such as narrative (Fox, 1987) expository (Britton, 1994), persuasive (Berzlánovich et al., 2008), and dialogic texts (Buitkiené, 2005). The findings of these studies show that texts of different genres serve distinctive LCPs that need to be addressed in teaching writing. However, study of communicative moves of academic writing and their interactions with the LCPs centralized within such moves have not as yet been conducted. Hence, further research is still needed to determine the actual interaction of rhetorical moves associated with LCPs found in particular academic texts. Therefore, the second purpose of this study was to examine the relationships between LCPs and the moves of Discussion section in which they are centralized.

2. Discussion Sections in RAs

The Discussion section of a RA is a section that precedes the Conclusion section and follows the Results or Findings sections. Conventionally, Discussion is the section where the main findings are stated, results are evaluated, findings are explained, compared, and contrasted to the previous research, limitations of the study are presented, and the remaining points for further research are suggested. The Discussion section, among different sections of academic RAs, is the subgenre

(Bhatia, 2001) which has been studied quite extensively (Amirian et al., 2008; Biria & Tahririan, 1997; Holmes, 1997; Kanoksilapatham, 2007; Samraj, 2008; Swales, 1990; Yang & Allison, 2003). These studies attest to the importance of this academic genre within various disciplines and cultures. Many researchers such as Wilkinson (1991) and Swales and Feak (1994) noted that the writing of the Discussion section is a difficult job for academic writers. Swales and Feak (1994) commented that giving general suggestion on how to write a Discussion section is neither easy nor productive because two factors (i.e., different types of questions and statement of the problems as well as the position of the Discussion section) lead to the considerable variation in writing of this section. Swales (1990) confirms that there is "much variation in the extent to which Results sections simply describe results and the extent to which Discussion sections redescribe the results" (p. 170). That is why various analytical frameworks for this section have been proposed. Belanger (1982, cited in Swales, 1990) analyzed 10 Discussion sections of RAs in the field of neuroscience. Based on the data, he proposed that the structure of Discussion sections is closely correlated with the order of the research questions posed in the Introduction sections. Yang and Allison (2003), based on an analysis of different sections of 20 RAs in applied linguistics, proposed four different models for Results, Discussion, Conclusion, and Pedagogical Implications sections. The model they suggested for the Discussion section consists of 7 moves and 10 steps. They found that "reporting results" occurred in all the Discussion sections but one, so it can be considered as quasi-obligatory. This finding amply supports the (reasonable) expectation that in the Discussion section the communicative focus is on "commenting on results" (Yang & Allison, 2003).

Nwogu (1991), by using the ESP approach to analyze the genre of health and medical news, examined the move structure and linguistic features of popularised medical texts. In his analysis, he identified nine moves. The nine moves identified by Nwogu (1991) were classified into initial moves, medial moves, and final moves. Move 8 which is located in final moves aims at restating the main observations in the study by indicating significance, interpretation, justification, and by contrasting them with previous studies. Kanoksilapatham (2007), following Swales' (2004) move analytical model for Introduction sections, analyzed a corpus of biochemistry RAs written in Thai and English. The results revealed a four-move structure for the Discussion sections. The identified moves are "contextualizing the study," "consolidating results," "stating limitations," and "suggesting further research." In this model, Kanoksilapatham (2007) emphasizes that the initial move of the Discussion section is the mirror of the initial move of the Introduction section. In other words, similar to the scholars such as Weissberg and Buker (1990), Kanoksilapatham (2007) expects the Discussion section to decline from the specific to general information, from the particular information reported in the Introduction,

Methodology, and Results sections to a more general view of how the information should be interpreted. Reviewing the aforementioned genre studies which incorporated a variety of frameworks used to analyze Discussion sections, one can find lots of variations in the structure of this section. The differences are essentially rooted in the frameworks of analysis (Yang & Allison, 2003). They accounted for this claim by comparing their proposed framework for the Discussion section with the ones given by Hopkins and Dudley-Evans (1988) and Holmes (1997). They found that similarities and differences can be found across the frameworks. Yang and Allison (2003) also argued that it is possible to capture the general trends and specific rhetorical organizations in an insightful way. The discrepancies of the findings for the rhetorical structure of the Discussion section and the variability of the frameworks proposed for this section justify further research. Therefore, in this study, two models given by Nwogu (1991) and Kanoksilapatham (2007) posited for the analysis of the schematic structure of the Discussion section of ESP RAs were applied in order to identify the communicative purposes of the Discussion section as expressed through their move structure.

3. This Study

This study sought answers to the following questions:

1. What rhetorical patterns for RA Discussion sections are preferred by international and Iranian local journals in ESP RAs?

2. Do the findings match Kanoksilapatham's (2007), and Nwogu's (1991) models?

3. How do local and international journals employ different LCPs within the moves of Discussion sections in ESP RAs?

3.1. The Corpus

The corpus consisted of 80 RAs written in ESP RAs across four Iranian and four international journals (IJs), 10 from each journal. Following Nwogu's (1997) suggestions for selection of the journals used in such corpus studies—representativeness, reputation, and accessibility—a list of international and Iranian local journals (ILJs) in the area of ESP were selected. In so doing, four ILJs from *Journal of Biotechnology* (IJB), *Journal of Agricultural Sciences and Technology* (JAST), *Journal of Iranian Chemical Society* (JICS), and *Medical Journal of Islamic Republic of Iran* (MJIRI) were chosen. These journals cover a good number of RAs written in biotechnology, agriculture, chemistry, and medical sciences, respectively. The ESP international journals included *Agriculture, Ecosystems and Environment* (AEE), *Journal of Chemical Technology and Biotechnology* (JCTB), *Analytica Chimica Acta* (ACA), and *Medical Hypotheses* (MH). The selected IJs were also all

prestigious journals available in *Sciencedirect* database. The other criteria for the selection of the journals were their easy accessibility and their publication in major fields of ESP. The RAs derived from the international and ILJs followed the IMRD (i.e., Introduction, Methodology, Results, and Discussion) structure. All of the RAs were culled from the e-versions of the published papers of ESP journals. For the sake of consistency of the results, the selected RAs were published between 2005 and 2010.

3.2. Analytical Framework and Data Analysis Procedure

The present study used a bottom-up approach to identify the moves and steps based on the function or content of the text in the articles. In the top-down stage, Nwogu's (1991) and Kanoksilapatham's (2007) models were drawn upon to analyze the schematic structure of the Discussion sections of RAs. The proposed models identify the typical sequence of moves and steps that form the structural organization of RAs in ESP areas of study. The main criteria for the identification of moves and steps were the Swales' (1990) lexicogrammatical signals. Swales (1990) suggested that each move and step has its own lexicogrammatical features which repeatedly occur in various RAs. For instance, phrases such as *A gender difference was observed in the functions . . . , the findings of this study support . . ., therefore, it can be claimed . . .*, and *as the following example indicates . . .* were used to show the presence of different steps of move 1 in Kanoksilapatham's (2007) model.

In the second stage, a bottom-up procedure for move analysis was adopted. All the moves and steps, irrespective of the examined models employed by the writers, were coded and their frequency and rate were counted. Those moves and steps which were not presented in the models were labeled as new moves and steps. The index for the stability of the moves and steps was based on the Swales' (1990) model: the occurrence of a move in more than 50% of the corpus. In such cases, the move is obligatory; otherwise, it is optional. The frequency and variation of the moves (if any) and their steps across the corpora were subjected to chi-square to determine the significance of the results.

After the move identification process, the LCPs manipulated within the identified moves, which were classified in four moves for the Discussion sections, as the model given by Kanoksilapatham (2007), were identified and counted in the ESP RAs. The frequency of the counted LCPs was subjected to chi-square to indicate the possible discrepancies between the international and Iranian local RAs regarding the use and application of these patterns.

4. Results and Discussion

4.1 *Structure of Discussion Sections*

The overall structure of the ESP Discussion sections, according to Nwogu (1991) and Kanoksilapatham (2007), is given in Table 1:

Table 1. *Structure of Discussion Sections in ESP RAs*

Kanoksilapatham's model	Medical Sciences		Chemistry		Agriculture		Biotechnology	
	L	I	L	I	L	I	L	I
Move 1 Describing established knowledge	1	2	-	-	-	-	4	1
making generalization	2	-	-	-	-	-	1	-
Move 2 restating methodology	3	-	4	4	3	2	3	5
stating selected findings[*]	10	10	10	10	10	10	10	10
referring to previous findings[*]	10	8	6	7	10	10	10	9
explaining differences in findings	4	1	-	-	1	1	-	2
making claims	2	2	-	1	3	5	4	2
Exemplifying	-	3	-	-	-	1	-	2
Move 3 Stating limitations	2	1	-	-	-	-	-	-
Move 4 Suggesting further studies	2	5	-	1	1	-	-	1
Nwogu's model								
Move 8 by stating a specific outcome[*]	10	10	10	10	10	10	10	10
by explaining principles and concepts	-	-	-	-	-	-	-	-
by indicating comments and views[**]	6	6	-	1	4	7	4	6
by indicating significance of main research outcome	2	3	7	1	4	5	5	9
by contrasting present and previous outcomes[*]	10	8	9	7	10	10	10	10

Note. L: Iranian local RAs, I: International
[*]Common obligatory steps across two groups; [**]Obligatory step across one group

Table 1 displays the frequency of steps in the four disciplines of ESP across the two international and Iranian local RAs. On the basis of the obtained data, the Discussion sections in ESP RAs consist of two obligatory steps: "stating selected findings" and "contrasting the findings with previous ones." The findings are in line with Hopkins and Dudley-Evans (1988), Swales (1990) and Yang and Allison (2003). Hopkins and Dudley-Evans (1988), in their 11-move scheme, reported that the "statement of results" is an obligatory move in the Discussion section. The eight moves in Swales (1990) and those in Holmes (1997) largely followed this scheme and remained similar. Swales (1990) claims that if there is one quasi-obligatory move in Discussion sections, it is "statement of results," whereas Holmes (1997) finds that there is no completely obligatory move in social sciences RA Discussion sections. Yang and Allison's (2003) study supports the view that the move "reporting results" (comparable to "statement of results") is quasi-obligatory. In all of these studies, in contrast with the current study, contrasting the findings with previous research was an optional step. Nevertheless, there are two other steps (i.e., "indicating comments and views" and "indicating significance of the study") which occurred in high frequency. The former step is a combination of explanation, exemplification, and making claims by the researcher. Its occurrence was 20 and 14 across the international and Iranian local Discussions (ILDs), respectively. Therefore, this step is obligatory in the international Discussion sections. Yang and Allison (2003) found that "commenting on results" was an obligatory move in the Discussion sections. Indicating significance of the study was present equally in 18 RAs across the two corpora. Although its frequency is lower than half of the total number of Discussion sections, ESP writers have strong tendency to state the significance of their findings in various parts of the Discussion section.

Looking at the data in Table 1, one can find frequency discrepancies across the two corpora. However, the chi-square findings revealed significant differences in the fourth step in Nwogu's (1991) model, "indicating significance of the study" (X^2 = 4.5, $Sig.$= 0.03). In the bottom-up procedure, some new steps have been found in the corpus. In the Iranian local RAs, presenting a brief review of literature (13, 30.5%), restating purpose (5, 12.5%), gap restating (7, 17.5%), evaluation (4, 10%), and concluding remarks (3, 7.5%) were found to be present, whereas in the international RAs, presenting a brief review of literature (6, 15%), restating the purpose and problem (8, 20%), and evaluation (20, 50%) were identified as new steps. According to the frequency of the new steps, the evaluation step, in the international Discussion sections, was found to be obligatory. Other steps were optional. Therefore, it can be concluded that the main differences between the international and ILDs are found in the moves that researchers used to report the results of the study and evaluate them. In other words, to use Swales' (1990) explanations on his eight-move scheme for the Discussion section, the ILJs are not

rigorous in commenting on the (un)expected results, suggesting reasons for a surprising result, giving examples for supporting an explanation, making claims about the generalizability of the results, and finally justifying the obtained data based on the suggested hypothesis. It should be noted that these findings are derived from the analysis of the total number of RAs across the two corpora. Samraj (2002) believes that related genres can have variant structures. Hence, it seems that the differences between two corpora could be more salient if each discipline is discussed independently. In so doing, the organization of the Discussion sections in medical sciences, chemistry, agriculture, and biotechnology across the two international and Iranian local contexts is discussed in turn below.

4.2 Medical Sciences Discussion Sections

According to Kanoksilapatham (2007), Discussion sections open with contextualizing the study by reference to the established knowledge in the field or making topic generalization. Two international Discussion sections and three Discussion sections of the Iranian local RAs had this initial move. Therefore, it seems that the RAs investigated began this section with the move or steps not distinguished by Kanoksilapatham (2007). The ILJs used some strategies such as restating the definition and hypothesis of the study, giving background, presenting a brief review of literature, and restating the gap and purpose to open their Discussion sections. However, none of them occurred in more than five Discussion sections; hence, all were optional steps. Three of the Discussion sections commenced with stating the selected findings—what Yang and Allison (2003) call "statement of the results." The international journals utilized the strategies such as giving a brief review of literature and restating the problem and purposes of the research to initialize their Discussion sections. One of them stated the limitations of the study; three presented the main findings, and one of them indicated the significance of the research outcomes as the opening strategies in their Discussion sections.

Following these opening strategies, the main moves and steps of Discussion section, where the researchers explain their research outcomes (Nwogu, 1991) or consolidate the results (Kanoksilapatham, 2007), can be identified. The ILDs and international RAs in medical sciences closely followed the order of steps, in the case of occurrence, identified by Kanoksilapatham (2007). They respectively restated their methodology (3, 0), stated selected findings (10, 10), referred to previous findings (10, 10), explained differences in findings (4, 1), and made claims (2, 2). However, the ILDs did not use the last step (exemplification) at all, whereas in the international Discussion sections, exemplification (3) was used. Among the steps identified by Nwogu (1991), the first and the last steps are similar to the second and the third steps provided in the second move of Kanoksilapatham (2007). Therefore, the results were the same. The second step, explaining principles and concepts, was

absent across two corpora. The third step, indicating comments and views, as it was discussed above, involves the explanation, making claims, and exemplifying steps given by Kanoksilapatham (2007). Moreover, evaluation of the findings (occurred in four international Discussion sections), as a new step, was also used to be covered under the realm of this step. As a result, indicating comments and views was present in all of the international Discussion sections, but in six Iranian local ones. Hence, this move is quasi-obligatory across the international Discussion sections within the field of Medical Sciences. Similar to the general analysis of the structure of Discussion section across international and Iranian local ESP RAs (section 4.1), the main differences between two groups were found to be present in this move. The findings of the analysis of medical sciences Discussion sections support the general conclusion. "Indicating significance of the study" was present in two Iranian local and three international Discussion sections. This step was observed to be used cyclically after presenting the main findings. The closing steps in two ILDs were "stating limitations" and "suggesting further research." Other Discussion sections were closed with comparing the findings with previous ones or commenting on them. The international Discussion sections were more eager to suggest the more exploratory research (5) and evaluate the findings (5), as the closing steps rather than stating the limitation of their study.

4.3 Chemistry Discussion Sections

The notable feature of the chemistry RAs which distinguished them from other ESP RAs is the combinations of Results and Discussion sections. This is a common characteristic across two international and Iranian local discourse communities. Because the focus of the current study was on the Discussion section, the moves and steps which were conventionally attributed to this section were identified and explained.

The rhetorical structure of the international Discussion sections was so simple. The identified moves and steps in this genre, except the evaluation step, completely overlap with the Kanoksilapatham and Nwogu's models. They regularly restated the methodology (4), stated main findings (10), compared the findings with previous ones (7), evaluated the outcomes (8), indicated the significance of the study (1) and making claims (1). The findings imply that the dominant structure of the international Discussion sections in chemistry involved three steps: "stating main findings," "referring to previous findings," and "evaluating the findings." One interesting instance was a Discussion section that just included two steps: "stating main findings" and "evaluating them." Therefore, it can be concluded that presenting main findings is a quasi-obligatory step in international Discussion sections.

In contrast, the ILDs consisted of more steps. The chemistry researchers presented the Discussion sections in the following way: giving a brief review of literature (2), restating purposes (2), restating methodology (4), presenting main findings (10), comparing and contrasting the findings with previous outcomes (6), evaluating the findings (3), and indicating the significance of the study (7). Though various steps have been identified in the Discussion sections, the obligatory steps were the following: "stating main findings, referring to previous findings" and "indicating the significance of the study." Similar to the international Discussion sections, presenting main findings is a quasi-obligatory step in the ILDs. However, the main difference is attributed to the evaluation of the findings. Instead of evaluating the results, the significance of the findings was preferred to be used in the ILDs. These findings are consistent with the general results obtained in the medical sciences Discussion sections.

4.4 Agriculture Discussion Sections

As it was found in the analysis of the chemistry Discussion sections, the first move (contextualizing the study) was absent in the structure of the agriculture Discussion sections across both corpora. Instead, the ILDs used giving a brief literature review and restating the gap to initiate their Discussion sections. Similarly, in the international RAs giving a brief review of literature and restating the gap were used at the beginning of this section. Other Discussion sections in the Iranian local RAs began with restating methodology (2) and stating main findings (5). But the remaining Discussion sections of the international RAs started with stating main findings (8). The following steps used in the international Discussion sections were contrasting the results with previous outcomes (10), commenting on the results (9) which consists of explaining differences in findings (1), making claims (5), exemplifying (1), and evaluation of the results (2). The last step that they used was indicating the significance of the study (5). On the other hand, in the ILDs, after stating main findings (10) and contrasting those findings with previous ones (10), commenting on the findings (6) by explaining differences in findings (1), making claims (3), and evaluation of the results (2) were used. Following this step, similar to the international Discussion sections in the ILDs the significance of the study has been indicated (4). Although discrepancies in the use of commenting on the findings have been observed between the two corpora, a considerable harmony can be found in the structure of the Discussion sections across the two groups.

4.5 Biotechnology Discussion Sections

Different from the chemistry and agriculture Discussion sections, four ILDs began with describing established knowledge in the field and one Discussion section started with making topic generalization. In three of the Discussion sections in which describing established knowledge was preferred to be used, the next step was

a brief review of literature in which the gap and purpose of the study were restated. In one of the Discussion sections, giving a brief review of literature was used to open the section. The Iranian biotechnology researchers proceed from the opening strategies to restating methodology (3), stating main findings (10), referring to previous findings (10), making claims (4), and indicating significance of the study (5). No explanation, exemplification, and evaluation were found in the ILDs. Based on the data, the quasi-obligatory steps in the biotechnology Discussion sections were stating main findings and referring to previous results. In addition to these obligatory steps, it seems that, in the ILDs, it is preferred to indicate the significance of the findings instead of evaluating or commenting on them.

Among the international Discussion sections, in one Discussion section, the established knowledge in the field, as the opening strategy, was discussed. The remaining nine Discussion sections began with restating purpose (1), giving a brief review of literature (3), restating methodology (1), and stating main findings (4). Following these opening strategies, stating main findings (10), comparing them with previous outcomes (9), and commenting on the findings (9) by explaining differences in findings (2), making claims (2), giving examples (2), and evaluating the results (8) were observed. They continued these steps by indicating significance of main findings (9). As the data showed, the main differences between the international and Iranian local biotechnology Discussion sections are remarkable in evaluating the results and indicating significance of the study. In nine international Discussion sections, the writers used these steps as the main strategies in presenting their study.

In summary, two main findings regarding the analysis of the structure of the ESP Discussion sections were the following: (1) The main differences between the IJs and ILDs were found in the way the researchers commented on the findings and revealed their views. In the Discussion sections of the international RAs, the researchers dared to make claims and evaluate their findings. However, it seems that the writers in the ILDs were more conservative and did their best to limit their Discussion sections to stating the main findings and comparing their results with previous ones for the sake of supporting or rejecting their preliminary research hypotheses. Therefore, it seems that the ILDs had fewer tendencies towards the evaluation and deduction—what the prestigious manuals make pain to be found in the submitted RAs. On the other words, the ILJs needed to raise their researchers' consciousness regarding the argumentative nature of the Discussion section. (2) It seems that the steps identified in the ESP RAs do not overlap evenly the steps provided by Nwogu (1991) and Kanoksilapatham (2007). Therefore, a revised model is needed to represent the overall organization of ESP RAs. The suggested model is given in Table 2. The first move of this model is the same as the first move

given by Hopkins and Dudley-Evans (1988) and Yang and Allison (2003). However, in their models, this move is single-layer, whereas in the present model, this move consists of four steps. The second move is the same as what Kanoksilapatham (2007) included in his model. The third move presented in proposed model is the same as the fourth move in Yang and Allison (2003); however, the steps that manifest this move are different except for evaluation step. Indicating significance of the study is the fourth move in the proposed model in Nwogu (1991). The last two moves are the same as the final moves in Kanoksilapatham's (2007) model. One of the advantages of the proposed model is its two-layer scheme. Yang and Allison (2003) believe that the hierarchical (two-layer) scheme of analysis is preferable to the single-level scheme of analysis. The reason for this is the advantage of distinguishing the communicative purposes from the rhetorical techniques realizing the purposes, hence capturing more fully the structure of the Discussion section. Another merit of the model is that the model is derived from a combination of two datasets in different discourse communities and disciplines. Thus, it can be a generalizable model, though it requires more exploratory studies to examine its applicability and generalizability. Examples for each step are given in Table 2 in the proposed model for the structure of Discussion sections in ESP RAs:

Table 2. *Proposed Model for Structure of Discussion Sections in ESP RAs*

Move 1: Giving background

By giving a brief review of literature
By restating the purpose or gap
By describing established knowledge
By making generalization

Move 2: Consolidating results

By restating methodology
By stating selected findings
By comparing and contrasting present and
     previous outcomes

Move 3: Indicating comments and views

By explaining differences in (un)expected findings

By making claims

By evaluating the results

By giving examples

Move 4: Indicating significance of the study

Move 5: Stating limitations

Move 6: Suggesting further studies

➤ **Move 1 (M1): Giving background**

  ○ **Step 1: Giving a brief review of literature:** *Host plant availability and quality may play a role in . . . . In the case of DBM, few life table studies as regards its various host plants have been published and only a few studies have examined the effect of . . . . the overall performance of this species. Gap} {Host plant has different effects on development . . . (Wakisaka et al., 1992 . . .). Life history of DBM can vary considerably depending upon such various factors . . . (Ooi, 1986 . . .).* (ILJs, Agriculture Discussion section)

  ○ **Step 2: Restating the purpose or gap:** *At one of the aims of our research was developing green chemistry by using water as reaction medium or by performing organic transformations under solvent-free conditions [11, 12].* (ILJs, chemistry Discussion section)

  ○ **Step 3: Describing established knowledge:** *Strong differences of seed predation rates between weed species have been frequently reported (e.g., Kollmann and Bassin, 2001 . . .).* (IJs, agriculture Discussion section)

  ○ **Step 4: Making generalization:** *Approximately 4% to 6% of children will have a seizure by 16 years of age [6] and generally, 70% of seizure disorders start in childhood.* (ILJs, medical sciences Discussion section)

➢ **Move 2 (M2): Consolidating results**

   o **Step 1: Restating methodology:** *In order to investigate the effects of the Schiff base substitutions on the oxidation potential of [VOL], voltammetric experiments were carried out in DMF solution at room temperature, taking into consideration . . . .* (ILJs, chemistry Discussion section)

   o **Step 2: Stating selected findings:** *The association between lactase persistence and CD incidence observed in the correlation analysis appeared to be strong and was confirmed by the multiple regression analysis . . . .* (IJs, medical sciences Discussion section)

   o **Step 3: Comparing and contrasting present and previous outcomes:** *This result is an additional negative relationship previously detected between effects of farmland intensification and birds (Krebs et al., 1999; Donald et al., 2001) and for particular species or specific types of farmland (Verhulst et al., 2004).* (IJs, agriculture Discussion section).

➢ **Move 3 (M3): Indicating comments and views**

   o **Step 1: By explaining differences in (un)expected findings:** *These data differ from those reported previously by other groups (2.58 and 3.73 nM for nonpregnant women) [22,24]. The difference could be related to the physiological state or the timing of processing of their biological samples.* (IJs, chemistry Discussion section)

   o **Step 2: By making claims:** *Therefore, differences in the number of fruits lost due to pest attacks are likely because of the initial differences in rates of fruit wilt. Hence, achieving a decrease in fruit wilt only may not lead to increased yields.* (IJs, agriculture Discussion section)

   o **Step 3: Evaluating the results:** *The selectivity of the optimized conditions for converting porphyrin to porphyrinogen implies that further hydrogenation to disrupt the aromaticity of the pyrrole rings and to reduce the carbonyls requires more stringent conditions.* (IJs, biotechnology Discussion section)

   o **Step 4: giving examples:** *Using such fold excesses of solvents to extract AEA from plasma is impractical; for example, a 2-ml plasma sample would require 80-1000 ml of extraction solvent.* (IJs, chemistry Discussion section)

In the forthcoming sections, the LCPs that were identified in four moves of the Discussion section are described, and special attention is drawn to the differences that emerged from this study between the international and Iranian local RAs in terms of frequency and use of LCPs. It should be noted that for the move-related LCPs analysis, the basic move model was Kanoksilapatham (2007). However, the new identified steps as well as the significance of the study and stating comments and views, as the steps in Nwogu (1991), were added to the second move of the model.

6. Move-Related LCPs in ESP Discussion Sections

To find answers related to the relationships between communicative moves of ESP RAs with the LCPs centralized within such moves, first of all, the length of the Discussion sections of these RAs were counted (see Table 3). According to this Table, the longest ILDs belonged to the medical sciences RAs (927 average words for each section), whereas the longest IJs were found in the agriculture RAs (1,181 average words for each section). Coxhead (1998) and Stubbs (2001) found that longer texts allow for more frequency of occurrence as well as variety of vocabulary. Therefore, it is hypothesized that more LCPs can be found in the abovementioned Discussion sections. The results of the application of Hoey's (1991) model supported this hypothesis (see Table 4). The application of Hoey's (1991) LCPs model in the Discussion sections of the international and Iranian local RAs revealed that SR and CR had the highest frequency amongst the whole LCPs (Example 1). The data suggested that these two LCPs, among others, had the most important role in the coherence of the RAs of the different disciplines. This conclusion is in line with Hoey (1991) who found that lexical repetition is the major factor in the relatedness of a whole text.

➢ Example 1: *The silkworm lines which show substantial **variation** in their qualitative and quantitative traits . . . with many other ethological traits are used to differentiate **varieties** and selection of parental strains.* (ILJs, biotechnology Discussion section).

Table 3. *Frequency and Distribution of Words and Sentences in Discussion Sections of ESP RAs*

	Discussion Section				
	Journals	Words	Sentences	Average words	Average sentences
L	Medical Sciences	9275	381	927	38
	Chemistry	7925	278	792	27
	Agriculture	5897	209	589	20
	Biotechnology	5606	215	560	21

I	Medical Sciences	8390	306	839	30
	Chemistry	8444	324	844	32
	Agriculture	11810	429	1181	42
	Biotechnology	5152	198	515	19

Note. L: ILJs, I: International journals

Hoey (1991) also believes that LCPs from SR to the C-R are ranked in decreasing order of importance. However, results of this investigation slightly supported this conjecture because, for instance, ACP (Example 2) had higher frequency than SPP in both international and Iranian local ESP Discussion sections (see Table 4).

Table 4. *Number of LCPs in Introduction and Discussion Sections of Local and International Journals*

Journals	*N* of LCPs in Discussion Sections							
	SR	CR	SMP	SPP	ACP	Sup	H	C-R
Local Journals								
Medical Sciences	2385	113	15	3	80	4	5	6
Chemistry	1422	112	18	2	26	2	2	1
Agriculture	990	58	10	2	24	1	1	4
Biotechnology	1336	52	5	3	31	2	2	3
International Journals								
Medical Sciences	2070	74	12	2	41	2	1	1
Chemistry	2260	78	9	1	16	1	2	1
Agriculture	2804	63	17	2	17	1	1	2
Biotechnology	650	16	5	4	7	1	1	1

Note. SR: Simple Repetition, CR: Complex Repetition, SMP: Simple Mutual paraphrase, SPP: Simple Partial Paraphrase, Sup: Superordinate, ACP: Antonymous complex paraphrase, H: Hyponymy, C-R: Coreferences

Table 4 displays the overall distribution of LCPs across the Discussion sections of the total corpora. To find how these cohesion patterns were distributed across the moves of these sections, after move identification process, the frequency of these patterns were counted in each move (see Table 5). The data given in the table suggested that the LCPs were evenly distributed in M2 (consolidating results) of the Discussion sections across the ESP RAs of the international and ILJs. In the other moves, SR and CR occurred. It seems that the distribution of LCPs in the Discussion sections of the ESP RAs was more restricted to a specific move (M2). Hence, it can be implied that M2 of the Discussion section is the most important move in ESP RAs. Moreover, the harmony that was observed across both groups of

ESP RAs, regarding the use of LCPs, indicating that the writing conventions as well as the manipulation of lexicon in the ESP texts have been accepted.

> Example 2: *Actually, these results are **in contradiction with** another study where no association was found between lactose intolerance and inflammatory bowel disease in Germany [31]. This discrepancy could probably be caused by the lower level of genetic variability within a country than among different countries. On the other hand, the results of the principal component analysis . . . could be the ruminant population required for production of both milk and meat. This would be **consistent with** the findings of Abubakar et al. [12].* (IJs, medical sciences Discussion section)

Table 5. *Number of LCPs in Moves of Discussion Sections of International and ILJs*

Journals	LCPs	N of LCPs in Moves of International Discussion Sections				N of LCPs in Moves of ILDs			
		M1	M2	M3	M4	M1	M2	M3	M4
Medical Sciences	SR	-	2070	-	-	-	2385	-	-
	CR	-	74	-	-	-	113	-	-
	SMP	-	12	-	-	-	15	-	-
	SPP	-	2	-	-	-	3	-	-
	ACP	-	41	-	-	-	80	-	-
	SUP	-	2	-	-	-	4	-	-
	H	-	1	-	-	-	5	-	-
	C-R	-	1	-	-	-	6	-	-
Chemistry	SR	-	2245	-	-	18	1404	-	-
	CR	-	78	-	-	2	110	-	-
	SMP	-	9	-	-	-	18	-	-
	SPP	-	1	-	-	-	2	-	-
	ACP	-	16	-	-	-	26	-	-
	SUP	-	1	-	-	-	2	-	-
	H	-	2	-	-	-	2	-	-

	C-R	-	1	-	-	-	1	-	-
Agriculture	SR	-	2802	-	-	-	990	-	-
	CR	-	63	-	-	-	58	-	-
	SMP	-	17	-	-	-	10	-	-
	SPP	-	2	-	-	-	2	-	-
	ACP	-	17	-	-	-	24	-	-
	SUP	-	1	-	-	-	1	-	-
	H	-	1	-	-	-	1	-	-
	C-R	-	2	-	-	-	4	-	-
Biotechnology	SR	10	611	8	21	10	1296	10	20
	CR	-	16	-	-	-	52	-	-
	SMP	-	5	-	-	-	5	-	-
	SPP	-	4	-	-	-	3	-	-
	ACP	-	7	2	-	-	29	-	-
	SUP	-	1	-	-	-	2	-	-
	H	-	1	-	-	-	2	-	-
	C-R	-	1	-	-	-	3	-	-

Note. SR: Simple Repetition, CR: Complex Repetition, SMP: Simple Mutual paraphrase, SPP: Simple Partial Paraphrase, Sup: Superordinate, ACP: Antonymous complex paraphrase, H: Hyponymy, C-R: Coreferences

Nevertheless, to support these implications, the data were subjected to the chi-square analysis to determine the significance or insignificance of the possible differences, in terms of LCPs utilization, between the international and Iranian local ESP RAs (see Table 6). As the chi-square results showed, significant differences were observed in the Discussion sections of the international and Iranian local RAs. The differences in the Discussion sections totally occurred in M2. The significant differences were observed in the use and frequency of SR, CR, and ACP in the medical sciences and biotechnology RAs; SR and CR in the chemistry RAs; and SR in the agriculture RAs. The findings suggest that (1) uneven use of LCPs might affect the internal strength, that is, the argumentative and evaluative power, of the Discussion section; (2) the frequent occurrence of the LCPs in M2 show the determinative role of this move in the Discussion section; (3) in the international RAs, the writers more frequently used simple and complex LCPs in their academic texts than the writers in the ILJs. Therefore, though the writers in the ILJs seemed to

be aware of the norms in writing of academic texts, they were not well-mastered in the use of LCPs to attach the sentences of the text creating a meaningful whole.

Table 6. *Chi-Square Results for Determining Significance of Lexicogeneric Differences in Discussion Sections of ESP Journals*

Journals	LCPs	Moves of Discussion Section							
		M1		M2		M3		M4	
		X^2	*Sig.*	X^2	*Sig.*	X^2	*Sig.*	X^2	*Sig.*
Medical Sciences	SR	-	-	22.2^*	.00	-	-	-	-
	CR	-	-	8.1^*	.004	-	-	-	-
	SMP	-	-	.33	.56	-	-	-	-
	SPP	-	-	.20	.65	-	-	-	-
	ACP	-	-	12.5^*	.00	-	-	-	-
	SUP	-	-	.66	.41	-	-	-	-
	H	-	-	1.2	.25	-	-	-	-
	C-R	-	-	3.5	.056	-	-	-	-
Chemistry	SR	-	-	193.8^*	.00	-	-	-	-
	CR	-	-	5.4^*	.02	-	-	-	-
	SMP	-	-	.33	.56	-	-	-	-
	SPP	-	-	.33	.56	-	-	-	-
	ACP	-	-	2.3	.12	-	-	-	-
	SUP	-	-	.33	.56	-	-	-	-
	H	-	-	.00	1.0	-	-	-	-
	C-R	-	-	.00	1.0	-	-	-	-
Agriculture	SR	-	-	865.8^*	.00	-	-	-	-
	CR	-	-	.20	.64	-	-	-	-
	SMP	-	-	1.81	.17	-	-	-	-
	SPP	-	-	.00	1.00	-	-	-	-
	ACP	-	-	1.9	.27	-	-	-	-
	SUP	-	-	.00	1.00	-	-	-	-
	H	-	-	.00	1.00	-	-	-	-

	C-R	-	-	.66	.41	-	-	-	-
	SR	.00	1.00	246.0*	.00	.22	.63	.02	.87
	CR	-	-	19.0*	.00	-	-	-	-
	SMP	-	-	.00	1.00	-	-	-	-
Biotechnology	SPP	-	-	.14	.70	-	-	-	-
	ACP	-	-	13.4*	.00	-	-	-	-
	SUP	-	-	.33	.56	-	-	-	-
	H	-	-	.33	.56	-	-	-	-
	C-R	-	-	1.0	.31	-	-	-	-

Note. SR: Simple Repetition, CR: Complex Repetition, SMP: Simple Mutual Paraphrase, SPP: Simple Partial Paraphrase, Sup: Superordinate, ACP: Antonymous complex paraphrase, H: Hyponymy, C-R: Coreferences, X^2: Chi-square, $^*p < .05$

7. Concluding Remarks

Kwan (2006) contends that the increasing amount of research into various aspects of academic texts has contributed significantly to our understanding of the genre and its composing process. However, it seems that, more important than the genre consciousness is the way we translate the findings for pedagogical purposes. This is a common concern among genre analysts. Although findings of the genre analysis can be influential and effective in teaching writing, "it is less clear how—and when—these research findings can best be carried over into effective pedagogical practice" (Lee & Swales, 2006, p. 57). Undoubtedly, ESP students and researchers need considerable help at the structural, syntactical, and lexical levels in writing their own papers. This need is more salient among NNSs of English (Flowerdew & Wan, 2009; Lee & Swales, 2006) and those who have not experienced the research-based education. Therefore, it is highly recommended to make practical the findings of such genre studies in order to create a background for these students, on the one hand, and to provide a chance for them to publish in international journals, on the other.

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