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Abstract

Not many studies have focused on the analysis of the rhetorical organization of a genre and the respective frequency of occurrence of moves and steps as they occur in a corpus across disciplines – particularly, with a complementary qualitative-quantitative approach. This article aims to become a step in helping to fill this gap in research on Spanish. In this way, the *textbook* genre, the occurrence of its rhetorical macro-moves, moves and steps and disciplinarity are the central focus of this study. More specifically, in this article we seek to determine and to compare the frequency of occurrence of macro-moves, moves and steps in a corpus of 126 university textbooks across the academic discourse of four disciplines. We distinguish the major areas of knowledge (Basic Sciences and Engineering and Social Sciences and Humanities) as well as the specific disciplines (Social Work, Psychology, Industrial Chemistry and Construction Engineering). The main findings show there are differences between the occurrence of some discourse moves and steps across the texts of disciplines under study, which reveals a distinctive feature in the didactic component of textbooks. So we can infer that knowledge construction process through this genre is not carried out in the same way and that disciplinarity plays an important role in the diversifying organizational discourse patterns detected.

Keywords

Disciplinary variation, discourse genre, genre rhetorical organization, macro-move, move, university textbook

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Introduction

Textbooks have influenced the construction of specialized knowledge in a variety of disciplines in diverse learning contexts (Atienza and Van Dijk, 2011; Cubo de Severino, 2005b; Dimopoulos et al., 2005; Kearsley and Turner, 1999; Klamer, 1990; Kuhn, 1970; Parodi, 2010a; Swales, 1980, 1995). Using three sets of corpora (PUCV-2003 Corpus of Academic Spanish, PUCV-2006 Corpus of Academic and Professional Spanish, and PUCV-2010 Corpus of Academic Discourse), Parodi (2004, 2005, 2008, 2010a, 2010b, 2010c, 2012) and Parodi and Gramajo (2007) found that, compared to other genres, the textbook has had a strong impact on technical-professional education as well as undergraduate and graduate university programs and workplaces. Parodi (2005, 2008, 2010a, 2010b, 2010c, 2012) also found that texts belonging to this genre constitute an important part of the total amount of PUCV-2003, PUCV-2006 and PUCV-2010 corpora (33%, 26% and 7%, respectively). These facts seem to indicate not only the importance of the textbook as a means of accessing specialized knowledge, but also the way in which the textbook's predominant communicative purpose is exercised across texts (Klamer, 1990; Kuhn, 1970; Parodi, 2010a). Most textbooks seek to offer a first approach to new knowledge within an area of specialization as part of their communicative purpose (Cademártori et al., 2006); moreover, their rhetorical organization is supposed to help readers create a mental representation of specific disciplinary knowledge (Kintsch, 1998; Parodi, 2013; Van Dijk and Kintsch, 1983).

Despite this impact, little information exists regarding textbook genre organization from theoretical or applied perspectives. Study of the rhetorical organization of discourse genres has been restricted to only a few genres and has particularly concentrated on Research Articles (RA). Starting from the seminal work of Swales (1981), this genre has been profoundly explored in several languages, but most studies have examined RA published in English. It is likely that scientific interest in this genre is due to its fundamental function as a means of scientific communication. This, in turn, may have eclipsed investigation of the rhetorical organization of other genres, although such research is not entirely absent (e.g. Araya, 2011; Barbara and Scott, 1999; Bazerman, 1988; Bhatia, 1993, 2004; Biber et al., 2007; Bunton, 2002; Burdiles, 2012; Cubo de Severino, 2005a; Cubo de Severino et al., 2012; Dudley-Evans, 1986; Farlora, 2011; Gazali, 2005; Jarpa, 2012; Kwan, 2006; Martínez, 2012; Miin-Hwa, 2011; Moss and Chamorro, 2008).

Furthermore, existing literature features limited research focusing simultaneously on the rhetorical organization of discourse genres and on the respective determination of move frequency; thus, a complementary perspective in which qualitative analysis be validated quantitatively is important. Along these lines, it is even more difficult to find studies that complementarily approach investigation based on diverse and large corpora of texts collected from ecological principles and covering a range of disciplines. Few exceptions are documented, such as the research conducted for English by Kanoksilapatham (2007), although comparatively focusing on a different genre with texts of limited length; Love (1991, 1993, 2002), Swales (1995) and Hyland (1999) have also examined textbooks written in English. For Spanish, the studies conducted by Cubo de Severino (2005b), Atienza and Van Dijk (2011) and Oteiza and Pinto (2011) on textbooks of varying levels of education have opened a key area of study based on corpora from a wide range of disciplines.

In this context, this study seeks to determine and to compare the frequency of occurrence of macro-moves, moves and steps in a corpus of 126 university textbooks across the academic discourse of four disciplines, as part of PUCV-2006 Corpus of Academic and Professional Spanish. The four disciplines involved are: Social Work, Psychology, Industrial Chemistry and Construction Engineering. Also, in this study I examine the patterns of variation among the rhetorical moves and steps across disciplinary discourse, with a view to determine if and to what extent disciplinarity emerges as a relevant factor in the rhetorical organization of textbooks.

This research article complements previous work (Parodi, 2010a), where the rhetorical organization of the textbook genre was thoroughly identified and described, based on the same corpus of 126 texts that constitute part of the PUCV-2006 Corpus of Academic and Professional Spanish. This is partly the reason why some theoretical underpinnings and also specific methodological steps are not discussed here in detail. This article is structured as follows: in the first part, a concise description of the rhetorical organization of the textbook is presented. Also, a new macro-level unit of analysis is introduced and justified (*Macro-move*). Then, the article presents a rich description of the corpus along with the methodology employed for analysis. The article concludes with a discussion of the results and avenues for further research.

Move analysis and the textbook's rhetorical organization

Move analysis of a genre aims to identify the communicative purposes of a text by categorizing diverse text units according to the particular communicative purpose of each unit (Swales, 1990). Each one of the moves can be identified in a text rhetorical section, revealing a specific communicative function. The unique organization of the moves of a specific genre is what provides its identity and distinguishes it from other genres. It is this underlying organization, inlaid in the textual surface, which must be identified and made visible by identifying the functions performed by linguistic structures. Swales (1981, 1990, 2004), Bhatia (1993, 2004) and Kwan (2006), as well as Biber et al. (2007), have proposed useful guidelines as to how to implement the functional identification of the text segments and the corresponding communicative goals or purposes. Interesting debates have accompanied the developments of these techniques, although not without controversial and remarkable discussions (Askehave, 1999; Askehave and Swales, 2001; Hyon, 1996).

An innovative macro-function in this initial model is the creation of the concept and coining of the term *macro-move* (Parodi, 2010a). This rhetorical macro-level helps reveal a) the length of texts making up this genre (normally more than 260,000 words each), b) the higher level of abstraction that is implicit in this analysis and c) the recursive functional organization of certain obligatory sections. As is well known, a move has been defined as a discourse unit performing a specific function in a text (Biber et al., 2007; Swales, 1990, 2004). Thus, each move has a particular communicative purpose and contributes to the overall communicative purpose of the genre. By using the term *macro-move*, we seek to define a discourse unit of higher rank than that of a move. This implicitly includes a more abstract view in terms of the communicative purpose that serves the

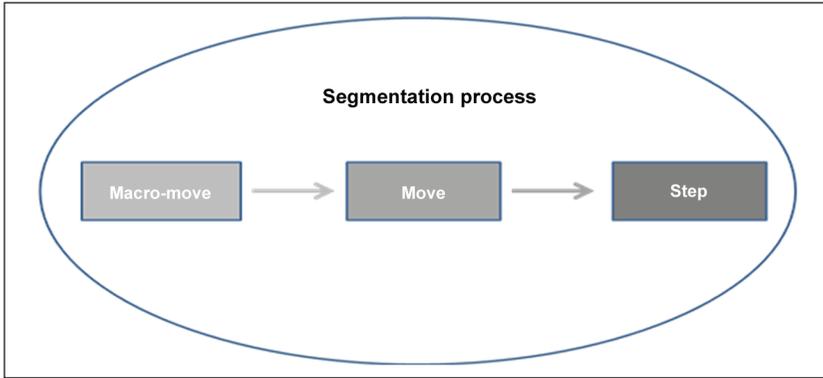


Figure 1. Segmentation process of the textbook functional components.

macro-move. This means that the analysis of the textbook's functional organization reveals a multilevel complex distribution that requires specification of a macro-purpose, including a set of more specific moves and, in turn, more detailed steps. This major form of organization also enables the differentiation of nuclear components and satellite components in the genre under study. In previous work, I argued that the detection and inclusion of this more abstract level and higher rank unit produces a more visible overall form of rhetorical organization, not only for the analysis, but also for possible pedagogical applications.

Thus, describing the rhetorical organization of a genre implies an analysis that determines the specific communicative purposes of all texts of the corpus by segmenting all discourse units that reveal a particular communicative purpose. Each one of the moves that represent these communicative purposes are intertwined with the more global and general communicative purpose of the genre as a whole. This is why the notion of macro-move stands as an important analytical tool in the description of a genre's rhetorical organization.

In a previous study, Parodi (2010a) identified and described in detail the rhetorical organization of the textbook genre. Figure 1 shows the way we applied the segmentation process to identify progressive communicative purposes, embedded in the textual organization. This process was operationalized from the general purpose of the genre through moves and steps. Figure 1 illustrates the segmentation process, presented according to rank as described above.

Starting from this procedure, the analysis of the data has led to the identification of three fundamental rhetorical macro-moves in the textbook genre: *Preamble*, *Conceptualization and Exercising* and *Corollary* (Parodi, 2010a). Each one of these operationalizes in moves and, more specifically, in steps. Some of these moves and/or steps constitute nuclear categories, while others clearly serve satellite communicative functions. This means that some obligatory categories are distinguished that are highly constitutive of this genre, while others are clearly optional. A summary of the identified textbook organization is illustrated in Figure 2.

Textbook genre organization is displayed in three macro-moves (*Preamble*, *Conceptualization and Exercising* and *Corollary*) and 10 moves. In a more detailed

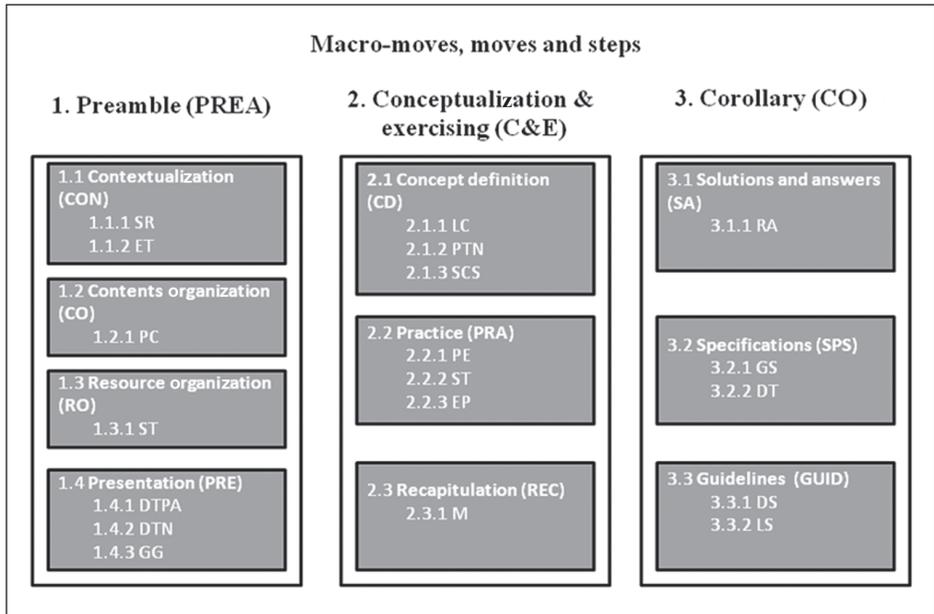


Figure 2. Rhetorical organization of the textbook genre.

organization, 19 specific steps were identified (Parodi, 2010a). For a summary of the rhetorical organization of textbooks, see Appendices 1, 2 and 3.

The conceptual/informative core of this genre is expressed in Macro-move 2, *Conceptualization and Exercising*, which acts as a recurring cyclical unit that appears as many times as the writer/author requires in order to cover the contents to be displayed; this means that the book may contain as many concepts and chapters are required to fulfil the contents. By means of this macro-move, along with its corresponding moves and steps, the students/readers are shown a set of technical definitions, explanations and descriptions. The students/readers, through these discursive procedures, are gradually presented with the new contents (Move 2.1), which are carefully exemplified and summarized. A particular concern is detected in exercising the nuclear contents and in the resolution of the tasks set forth (Move 2.2). The writer/author's guidance of the audience under training is also expressed in his/her reformulation of the thematic nucleus, since the macro-move is closed with a macro-semantization where summarizing strategies are offered (Move 2.3).

Parodi (2010a) reported that Macro-moves 1 and 3 (*Preamble* and *Corollary*) do not operate in the same way as Macro-move 2, since they are included only once throughout the text. It is only Macro-move 2 that occurs systematically as a prototypical feature of the textbook genre and thus becomes a recursive macro-move of great impact. Another interesting contrast between these macro-moves, detected by Parodi (2010a), is the flexibility and sometimes random distribution of the moves and steps of Macro-moves *Preamble* and *Corollary*. This second feature becomes another important difference compared to

Macro-move 2. In *Conceptualization and Exercising*, the organization is more rigid and hierarchical. Moves and steps do not mix, nor is the described order altered. This is probably due to the author's careful planning of these didactic resources, which are intended as a means to gradually approach specialized knowledge and the practical stage of exercising. This planning possibly responds to the author's awareness of the target audience involved in this genre (novice university students approaching a new subject field). Due to these prototypical features identified in the corpora under study, this genre has been called '*colony-in-loops*' (Parodi, 2010a). Undoubtedly, these functional mechanisms, through which sets of theoretical and practical units are delivered, are gradually introducing novices to the methodology and procedures of reasoning that future professionals should apply in order to become part of the discourse community. This implies that the student might be learning and acquiring not only conceptual or declarative knowledge, but also procedural knowledge.

The study

Corpus description

The corpus of 126 undergraduate university textbooks was collected and analyzed, following steps and criteria defined by research team as stated in Parodi (2010a). The number of texts and words comprising the corpus is detailed in Table 1.

The figures in Table 1 show how long the texts are in the four disciplines under study. Likewise, this information reveals a tendency towards a more frequent use of this genre in the disciplines of Basic Sciences and Engineering (BS&E). The number of textbooks is more than twice the number of texts as those dealing with Social Sciences and Humanities (SS&H). This difference may be partly due to the more important occurrence in SS&H of another discourse genre which seems to be the most common means of transmission and construction of specialized knowledge in Psychology and Social Work, that is, the Disciplinary Text (Ibáñez, 2010).

The number of words in this textbook corpus is also relevant to this discussion, since there is – to the best of my knowledge – no record of other studies based on about 24 million words. Moreover, as far as I am aware, there is no available bibliography describing corpora collected from four disciplines of university communication accounting for all texts used in overall undergraduate university curricula. There is scarce literature highlighting disciplinarity as the central feature of variability throughout genres written in Spanish.

Table 1. Numerical constitution of the corpus.

University programme	Area	Number of texts		Number of words	
Psychology (PSY)	Social Sciences and Humanities (SS&H)	31	46	4,925,931	7,391,678
Social Work (SW)	Humanities (SS&H)	15		2,465,747	
Industrial Chemistry (IC)	Basic Sciences and Engineering (BS&E)	31	80	9,161,146	16,097,358
Construction Engineering (CE)	Engineering (BS&E)	49		6,936,212	
Total		126		23,489,036	

Inter-rater reliability and method

The validation of the rhetorical organization for textbooks proposed by Parodi (2010a) was calculated by means of a triangulation process by three expert judges. The inter-rater reliability index reached for 87%. To address quantification of the moves and to determine the frequency of occurrence in the corpus of 126 textbooks, the analysis was performed based on disciplinary domains (Parodi, 2010a). During a subsequent phase, frequency counts by discipline were performed in a crosswise manner.

Results

Figure 3 shows the overall distribution of the macro-move and move frequencies of occurrence across the 126 textbooks of the corpus, separated in each knowledge domain: Social Sciences and Humanities (SS&H) and Basic Sciences and Engineering (BS&E). We then review more specific steps in each of the four disciplines under study. In order to allow comparisons, all figures were normalized and are presented as percentages.

Clearly, the textbook genre organization is not distributed homogeneously in all texts of SS&H and BS&E; interesting differences in the occurrence of some moves characterize the genre. Figure 3 shows that the macro-moves and moves are not equally represented in these textbooks. The data show that the texts of the corpus in BS&E reach 100% occurrence or near the maximum possible in almost all the moves of the three macro-moves identified. The only move with an occurrence under 90% is *Recapitulation* (REC). In this third move of Macro-move 2 *Conceptualization and Exercising* (C&E), textbooks of BS&E show 88% occurrence.

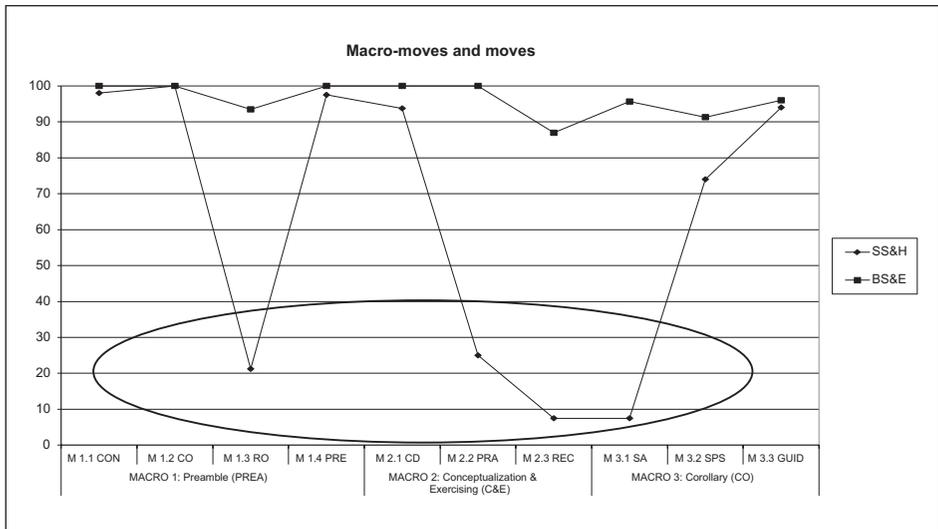


Figure 3. Macro-moves and moves in each knowledge area.

In contrast, Social Sciences and Humanities (SS&H) texts stand out due to a low frequency of occurrence in four of the 10 moves analyzed here. Within Macro-move 1 *Preamble* (PREA), the SS&H texts only amount to 20% in Move 1.3 *Resources Organization* (RO). Then, in Macro-move 2 *Conceptualization and Exercising* (C&E), the SS&H textbooks evidence only 20% in Move 2.2 *Practice* (PRA) and a minor occurrence of Move 2.3 *Recapitulation* (REC) (7%). Lastly, textbooks in this same knowledge domain maintain a 7% frequency of occurrence in Move *Solutions and Answers* (SA), as part of Macro-move 3 *Corollary* (CO).

These findings suggest that the pedagogical approach is different in BS&E and in SS&H, where disciplinarity shows diversifying rhetorical organization patterns. This tendency clearly points towards a specific textbook component as the distinguishing organizational feature between the two domains of knowledge under study. This overall analysis of the frequency of occurrence of macro-moves and moves in the entire corpus of textbooks identifies the didactic component, in which the tasks suggested are fully exercised, exemplified and solved. To thoroughly describe the rhetorical organization of the genre under study and delve into these first results, the frequency of occurrence for each step in each macro-move is determined.

Figure 4 shows that the data emerging from this in-depth analysis of texts from the two knowledge domains using macro-moves and steps support previous overall findings (Parodi, 2010a). The record of occurrence for each of the steps across the 126 textbooks shows that some steps in each of the three macro-moves show important numerical differences between the texts of both knowledge domains. The occurrence, equal to or less than 30% in six steps out of the total 19 steps in SS&H texts, reveals a focus that is not common to both areas. Comparatively, the low occurrence of some steps in the SS&H texts contrasts with a high percentage in the occurrence of all 19 steps in the BS&E texts.

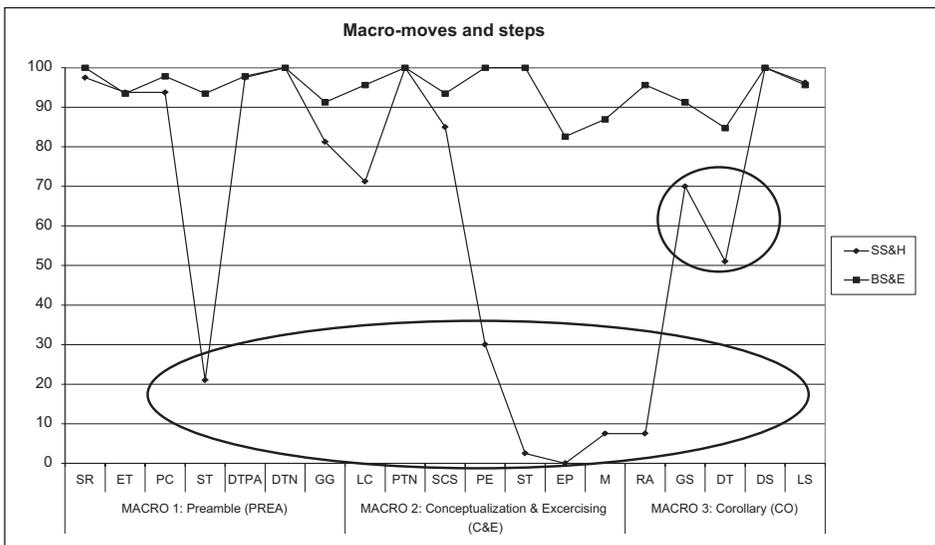


Figure 4. Distribution of the text genre's rhetorical steps in two knowledge domains.

Thus, most steps evidence 90 to 100% occurrence in BS&E. Only three steps ranged between 80 and 90%. This shows that BS&E textbooks perform the rhetorical organization identified herein, accomplishing each of the steps emerging from the analysis. Likewise, the pedagogic component can clearly be recognized in most BS&E texts. A comprehensible and well-organized decision is noticeable with respect to the pedagogical function of textbooks in BS&E, since these categories appear repeatedly and at the same level as other central categories.

An example of this step, *2.2.2 Solving the Task* from a Construction Engineering textbook is illustrated here. Excerpt 1 shows how exercises are solved and questions answered in a text from BS&E. As shown in Figure 4, this step is very rare in the SS&H textbooks. The tendency in these textbooks is to leave the questions open (without explicit answer. It is possible that it occurs in this way because the writers/authors are aware of the fact that ‘... (the student) has constantly before him a number of competing and incommensurable solutions to these problems, solutions that he must ultimately evaluate for himself’ (Kuhn, 1970: 165), so the tasks are possibly not solved due to the fact that the SS&H texts do not always convey a consensus among specialists (Becher and Trowler, 2001); alternative approaches tend to co-exist or co-occur, and ‘No synthesis is constructed and the reader is left with the task of making up his or her own mind’ (Klamer, 1990: 137).

The text excerpts are originally in Spanish, and are accompanied by the corresponding translation into English:

Excerpt 1 (2.2.2 Resolver la Tarea)

EJERCICIO 8. – Determinínense las reacciones en el sistema de dos barras solidarias ACB (Fig. 3-25a) con carga uniforme sobre la viga horizontal CB.

Solución. La reacción B y la carga son verticales; por consiguiente, de la primera ecuación [3-2] resulta in $H_a = 0$, o sea la reacción en A es también vertical. De esta manera, el sistema no difiere de una viga con apoyo fijo en C y deslizante en B. Las reacciones valen $A = B = Q/2$.

(IC-02)

(2.2.2 Solving the Task)

EXERCISE 8. – Determine the reactions in the system of two solid bars ACB (Fig. 3-25a) with uniform load upon horizontal beam CB.

Solution. The reaction B and the load are vertical; therefore, the first equation [3-2] results in $H_a = 0$, that is, the reaction in A is also vertical. In this way, the system does not differ from a beam with fixed support in C and sliding in B. The reactions worth $A = B = Q/2$.

(CE-02)

According to Figure 4, the SS&H texts do not always show the overall organization that is followed by the BS&E texts. Reduced or limited presence of some of the steps performing certain communicative purposes (e.g. ‘To point out solutions to the exercises’, see Appendix 3) concentrates on the proposal of exercises, tasks and problems and their guided solutions. Interpretation of these data reveals a contrast in the way these texts put

knowledge into practice. It seems clear that the nature of scientific disciplines makes different demands between knowledge domains (as the example in Excerpt 1 shows). In the BS&E texts, once a conceptual nucleus has been determined, exemplification and exercising are the fundamental means to integrate and stabilize new knowledge. In the SS&H texts, the nature of the objects of study, as well as the degree of abstraction involved in the conceptual clusters, does not directly lead to practical applications, as the way they are performed for Industrial Chemistry and Construction Engineering texts. However, this detected pattern could be reformulated in the SS&H textbooks, since there is no apparent reason why questionnaires or tasks accompanied by the corresponding guided solutions should not be included as part of these textbooks. There is a tendency displayed by textbook writers in SS&H disciplines to avoid exercising or solving tasks in a step-by-step fashion, and this could be seen as a distinctive feature of the subject matter under scrutiny.

Disciplinary emerges as a source of distinction and evidences the fact that knowledge is not delivered or exercised in the same way across the disciplines under study. Hence, a distinct mode arises from the data, where each discipline constructs, transmits and re-constructs knowledge in a different manner under one genre which is not totally unified in its organization. While the BS&E textbooks tend to concentrate on theoretical components and methods of analysis, the SS&H textbooks emphasize theorization, but not practical exercising nor the transmission of models to practice contents or apply this to actual exercises. These findings are similar to what Kuhn (1970) and Klamer (1990) found in respect to differences between SS&H and BS&E textbooks.

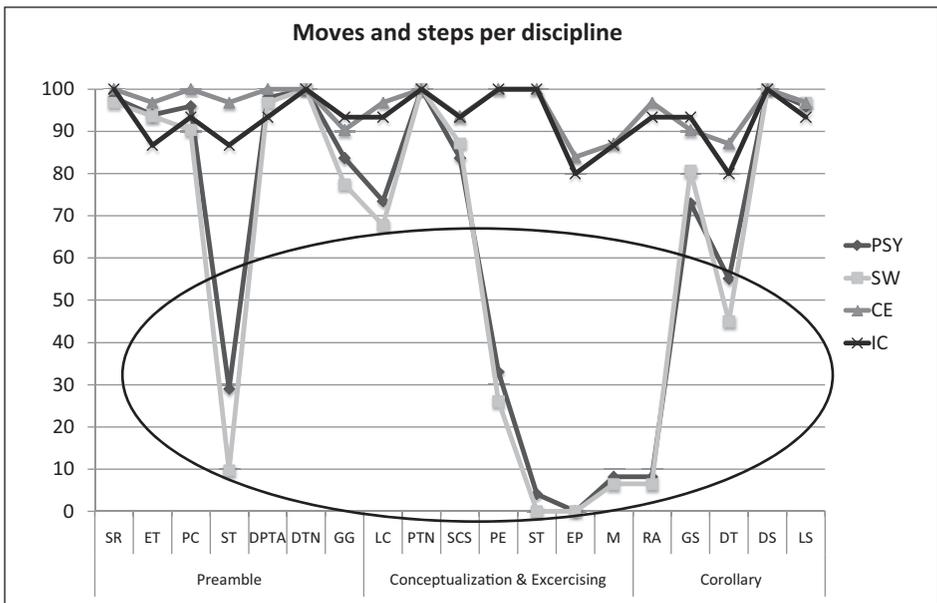


Figure 5. Frequency of textbook genre's rhetorical steps in four disciplines.

In order to further analyze these differences, the textbook corpus was subdivided into subcorpora representing each of the four disciplines. Figure 5 provides a detailed and comparative analysis of macro-move and rhetorical step frequency of occurrence.

Figure 5 shows that the regularity emerging from each of the 19 rhetorical steps throughout the texts of each pair of disciplines is surprising (SS&H and BS&E). According to the distribution of these steps to BS&E or SS&H, a clear pattern is identified. This can be seen in the structuring of information and rhetorical functions as explained below; on the one hand, in Psychology (PSY) and Social Work (SW) texts and, on the other, in Construction Engineering (CE) and Industrial Chemistry (IC) texts. This more detailed analysis support the findings presented in Figure 4.

The main differences lie in certain steps of each of the three macro-moves. *Supporting Comprehension* (SC) is the only step of the first macro-move that evidences substantial differences across the four disciplines. This step presents a frequency of more than 80% in CE and IC, but decreases sharply in SW (10%) and PSY (29%). In textbooks of these last two disciplines, lists of symbols employed throughout the texts do not emerge as a relevant feature, indicating that technical symbols that require explicit identification in lists supporting reading comprehension are not frequently employed. Conversely, in disciplines such as CE and IC, these iconic resources make up an important part of disciplinary knowledge, and the writer/author considers that they are a fundamental support for the reader. Besides, although exercises, problems and solutions are very relevant in the nucleus of textbooks in both CE and IC (near 90% occurrence in both disciplines), in PSY (33%) and SW (28%) the frequencies of occurrence are minor. However, although presenting problems or questions is a purpose that appears to be of relative importance in SS&H textbooks, the major difference between disciplines undoubtedly stems from *Solving the Task* (RT), *Expanding Practice* (EP) and *Macro-semanticizing* (M). These three steps corresponding to moves *Practice* and *Recapitulation* of macro-move *Conceptualization and Exercising* reveal the main distinction between CE and IC textbooks and PSY and SW textbooks. Undoubtedly, as may be observed in the percentages of occurrence, these steps are highly optional in these last disciplinary textbooks.

As a way to show the distinctive features of these disciplinary discourses, two examples are extracted from Industrial Chemistry and Social Work textbooks (Excerpts 2 and 3).

Excerpt 2 (2.2.3 Expandir Práctica)

EJERCICIOS DE REPASO

43 La Tabla 2.9 muestra el número de pacientes admitidos en una clínica psiquiátrica durante un determinado período de tiempo. Los pacientes se hallan clasificados por diagnóstico y por edad. Con estos datos, encontrar lo siguiente:

- (g) La probabilidad de que un paciente escogido al azar sea esquizofrénico.
- (h) La probabilidad de que un paciente escogido al azar sea esquizofrénico, dado que tiene de 25 a 34 años de edad.
- (i) La probabilidad de que un paciente escogido al azar sea esquizofrénico y tenga entre 25 y 34 años de edad.

(TS-46)

(2.2.3 Expanding Practice)**REVIEW EXERCISES**

43 Table 2.9 shows the number of patients admitted in a psychiatric clinic during a fixed period of time. The patients are classified by diagnosis and by age. Based on this data, it is possible to find the following:

- (g) The probability that a randomly chosen patient is schizophrenic.
- (h) The probability that a randomly chosen patient is schizophrenic, as it has from 25 to 34 years old.
- (i) The probability that a randomly chosen patient is schizophrenic and has between 25 and 34 years old.

(SW-46)**Excerpt 3 (2.3.1 Macrosemantización)****RESUMEN**

Para encontrar un sentido a la química descriptiva de los elementos representativos, hemos comenzado a construir en este capítulo una red de ideas interrelacionadas. Las cinco primeras ideas fundamentales, principios organizativos de la red, son la ley periódica, el principio de singularidad, el efecto diagonal, el efecto par inerte y la división de la tabla en metales, no metales y metaloides. Estos cinco componentes se resumen en la Figura 9.18.

(QUI-19)**(2.3.1 Macro-semantizing)****SUMMARY**

To make sense of the descriptive chemistry of the representative elements, we have begun to build in this chapter a network of interrelated ideas. The first five fundamental ideas, organizing principles of the network, are the periodic law, the principle of singularity, the diagonal effect, the inert pair effect and the division of the table into metals, non-metals and metalloids. These five components are summarized in Figure 9.18.

(IC-19)

The didactic component thus appears as the distinctive feature across the textbooks of the corpus in the four disciplines examined. More precisely, the exercising component, based on the presentation of problems and questions accompanied by the corresponding solutions, in some cases solved step-by-step and with a detailed analysis of the execution procedure employed, shows differences between the disciplines of BS&E and those of SS&H. The emerging pattern is highly irregular across the discourse of the four disciplines. While the CE and IC textbooks are very similar in the inclusion of the three final steps of macro-move *Conceptualization and Exercising*, PSY and SW textbooks show very limited or non-existent occurrence of these steps. Similar results are found in the first step of the last macro-move *Solving and Answering* (RA). The communicative purpose of this textbook section is to deliver very detailed and step-by-step solutions for the tasks and/or problems anticipated in the preceding steps of the previous macro-move. Once again, the frequency of this step in CE and IC texts is over 90%, and under 10% for

SW and PSY texts. It seems evident in the SW and PSY textbooks that the writer/author does not feel the need to explain the answers or provide a guided resolution in order to help students come up with the expected answer – although the communicative purpose of all texts is the same. This revealing attitude of the writers/authors of SW and PSY textbooks, in contrast to that of the writers/authors of IC and CE textbooks, suggests transmission of both a form of knowledge and methodological procedures, that is to say, declarative knowledge and procedural knowledge.

Accordingly, Macro-move 2 shows its importance as a functional category with a higher level of abstraction. Hence, the inclusion of the macro-functional level of analysis enabled the detection of differences between disciplines. This also reveals its potential identification as a new rhetorical function. If only the concept of a set of moves had been employed, textbooks might have been described as so different across the disciplines mentioned that we would have wondered if these all belong to the same genre. Incorporation of macro-level suggests the existence of a genre shared across four disciplines.

Although the texts of the four disciplines keep the global macro-purpose ‘. . . to instruct regarding concepts and/or procedures within a specialised thematic’ (Parodi et al., 2010) and, therefore, all of them reflect the defining feature of the textbook genre, there are important distinctions between the disciplines and the knowledge domains. However, the differences detected do not actually mean that the texts from these knowledge domains no longer belong to the textbook genre. On the contrary, with all of these texts reflecting the conventions of the textbook genre, there are interesting idiosyncrasies across the disciplines. The latter confirms an assumption that is repeatedly made in this study: differences in the way of articulating the didactic component between textbooks of different areas do not mean that these are no longer textbooks. What is indeed shown empirically is that the genre shows variation to a great extent in some disciplines (SW and PSY; CE and IC) and that there is also structural homogeneity in the variation pattern of disciplines belonging to the same domain (BS&E and SS&H).

As part of Macro-move 3: Corollary, there is also a distinctive step between BS&E and SS&H textbooks. It is when solutions to problems presented during the chapters are solved at the end of the text. So the tasks presented to the student are solved in a detailed manner in a separate part of the book, as seen in Excerpt 4 from an Industrial Chemistry text.

Excerpt 4 (3.1.1 Resolver y Responder)

RESPUESTA A LOS EJERCICIOS CAPÍTULO 2

2.1 La relación entre el radio atómico y el radio del núcleo es 1×10^5 respecto a 1. Si el radio del átomo fuera de 100 m, entonces el radio del núcleo sería de 0.0010 m o de 1.0 mm y su diámetro de 2.0 mm. La cabeza de un alfiler común tiene un diámetro de aproximadamente 1.0 mm.

2.2 (a) El número de masa para 26 protones y 30 neutrones es 56 uma

(b) 58.93079 uma ($1.661 \times 10^{-24} \text{ g/uma}$) = $9.955 \times 10^{-23} \text{ g}$

(c) El ^{64}Zn tiene 30 protones, 30 electrones y $(64 - 30) = 34$ neutrones.

(QUI-16)

(3.1.1 Solving and Answering)

RESPONSE TO EXERCISES

CHAPTER 2

2.1 The atomic ratio between the radius and the core radius is about 1×10^5 to 1. If the radius of the atom were 100 m, then the core radius would be 0.0010 m or 1.0 mm and a diameter of 2.0 mm. The head of a joint pin has a diameter of approximately 1.0 mm.

2.2 (a) The mass number for 26 protons and 30 neutrons is 56 amu.

(b) $58.93079 \text{ amu} (1.661 \times 10^{-24} \text{ g/amu}) = 9.955 \times 10^{-23} \text{ g}$

(c) The ^{64}Zn has 30 protons, 30 electrons and $(64 - 30) = 34$ neutrons.

(IC-16)

This difference in the way of leading a reader to approach disciplinary knowledge is linked to the way scientific work is conceived by the author or writer as a specialist in this discipline. It is also related to the best way of arranging the presentation of new ideas and of how the student is expected to organize knowledge in a specific discipline.

The empirical findings based on a Spanish corpus of textbooks partially correspond to what was previously stated by Halliday and Martin (1993), Martin (1998), Martin and Rose (2008), Martin and Veel (1998) and Wignell (1998, 2007a, 2007b), regarding differences between social and basic scientific texts written in English. Basically, these research works point towards a distinction between an abstract versus a technical mode, between SS&H and BS&E respectively. Although none of these investigations are supported by empirical analysis such as that presented herein, and these do not follow corpus-based principles (Parodi, 2010c; Tognini-Bonelli, 2001), their contributions generally establish a difference between the BS&E and SS&H texts in English.

An interpretation of the findings has led to distinguishing between *abstraction* and *concreteness* as key and unique features between SS&H and BS&E textbooks. Thus, while IC and CE texts tend to be concrete and precise in the way they articulate new concepts and indicate resolution procedures, PSY and SW text contents are comparatively more abstract: they do not necessarily correspond to a paradigmatic presentation of one single and exclusive scientific position. Likewise, in PSY and SW textbooks, permanent exemplification or exercising does not exist, and no straightforward intention of leading the reader to find a unique and definite way to solve possible emerging problems is observed. Moreover, no carefully laid out specifications as to the way a certain problem should be approached and solved were identified. Apparently, no specific and explicit ways of reasoning are decidedly being imposed on the reader of these textbooks, or at least they were not identified in the analysis performed.

PSY and SW texts showed something inherent to these disciplines: the *modus operandi* which the texts of SS&H put into practice is precisely the prototypical way in which this disciplinary knowledge is transmitted, constructed and gives form to each of these disciplines. It is not the presence/absence of a certain rhetorical component, but rather the intrinsic manner of approaching a theme and putting it into practice. Both PSY and SW texts evidence a pattern of how to organize contents and present them for study and learning. Hence, the abstraction and absence of definitive truths appear as the most common features in PSY and

SW texts. The tendency here is to meditate about the various models without describing a single pattern for the delivery of paradigmatic contents, that is, for delivery of well-grounded knowledge, unquestioned truths and concepts coming from a defined theoretical position.

In contrast, IC and CE textbooks also explicitly identify the manner in which the reader should approach knowledge and the expected reasoning format for the resolution of tasks is clearly described. This leads the reader to learn not only the concrete contents, but also the procedures of the disciplines and the steps that each new member in the process of apprenticeship pertaining to these communities is expected to perform and systematize for problems that might come up in the future. In short, IC and CE texts present a specific and clearly defined path that each student or novice must learn to follow precisely. The nature of IC and CE disciplines imposes a *modus operandi* that is very different from the one presented in PSY and SW textbooks.

As stated beforehand, for English Halliday and Martin (1993) propose a distinction between texts based on principles of abstraction and technicality; Martin and Rose (2008) propose a difference in terms of control of the social world and control of the natural world, and Wignell (1998, 2007a, 2007b) argues that there is a difference in terms of two grammatical resources: technical vocabulary and taxonomic relations (basically those of hyponymy and meronymy). All these investigations have mainly been developed within the paradigm of systemic functional linguistics of the Sydney School (Christie and Martin, 1997, 2007; Halliday, 1978; Halliday and Martin, 1993).

Discussion and conclusions

The findings for the Spanish language stemming from data in this article point to three major differences between the textbooks of two BS&E disciplines and two SS&H disciplines. These differences lie in 1) the way in which the pedagogic device is articulated, 2) the type of methodological procedures being transferred and 3) the degree of abstraction and concreteness of knowledge.

Thus, quantitative results delivered through the rhetorical steps of Macro-move 2 and their systematic occurrence in terms of the corpora of IC and CE show a clear and precise display of very specific didactic resources to introduce and guide novices in specialized topics and fundamental technical procedures of the disciplines in question. In turn, SW and PSY corpora show how the new knowledge is approached by these sciences and demonstrate that exercising and solving of possible tasks proposed are a minor focus of attention. Likewise, scarce or non-existent detailed explanations of desirable procedures and reasoning were found in SW and PSY texts. On the contrary, IC and CE texts evidenced explicit concern to prepare the construction of new specialized knowledge and to announce the resolution of exercises and problems, as well as indicating the discipline's ideal prototypical reasoning in order to achieve an expected outcome. From these two disciplines, diverging epistemological assumptions between the two groups of scientists and disseminators of knowledge give form to textbooks, originating this specialized genre. Hence, textbooks cannot be conceived exclusively as mere didactic instruments. It is true that a defined pedagogic model is underlying in the textbook, where the role of the writer as a disciplinary expert is to instruct a lay or semi-lay student in a specialized subject matter. This pedagogic model used across the textbooks stands out in that the

model provides a unique access route towards knowledge where a text is used to execute a one-way instruction process. The apprentice is thus initiated into a new world and develops disciplinary, cultural and social competences. In addition to the pedagogic model, students also gain perspective and understanding of the specific scientific field.

In short, a novice will not become an expert member of a discourse community by the exclusive process of reading university textbooks. As has been argued by Parodi (2010a), effective participation in a discourse community takes place, among other activities, when an expert member is also able to write fundamental disciplinary written genres and participate in other kinds of spoken communication (e.g. Bazerman, 1988; Berkenkotter and Huckin, 1995; Johns, 1997; Miller, 1984; Swales, 1990). In fact, a student certainly does not become a full and active member of a discourse community just by writing textbooks (an activity they rarely or never do). It is by means of reading and writing other specialized genres that the novice will eventually become a member of the community (Bhatia, 2002; Hyland, 2004). For example, writing Research Articles, Reports and Research Proposals, as highly specialized discourse means, constitutes a very important exercise in order to approach disciplinary practices. Likewise, for certain professionals, the production of Calculation Memories, Bidding Specifications and Medical Reports will show their expertise in daily communication. Nevertheless, the reading of textbooks as a means of initiation texts is fundamental as an articulating path towards a knowledge area and its specialized procedures. Thus, reading and writing are clearly revealed as highly interconnected processes. In particular, it is worth noting the way in which these interlink and complement each other as nuclear parts in disciplinary academic literacy (Parodi and Gramajo, 2007).

However, it is evident that the reading and writing of other genres leads the new members from 'knowledge-telling' to active 'knowledge-transforming' (Bereiter and Scardamalia, 1987). A gradual process is established by means of these progressive mechanisms towards the writing of specialized genres within a discipline, where the texts actually end up acting as 'paths towards knowledge' (Bartholomé, 1986). The processes of specialized reading and writing are not executed once and for all, but are complementarily articulated over a lifetime. Acquisition and mastery of discourse genre knowledge thus becomes an ongoing and progressive task which every novice member puts into practice every day of his/her academic and professional life. This shows that genres are highly dynamic objects that change progressively in order to meet information exchange and to fulfil interaction needs of writers and readers. It also evidences that discourse genres emerge, crystallize and may disappear or become obsolete in order to meet the communication purposes of the members from diverse spheres of academic and professional life (Bazerman, 1988; Miller, 1984; Parodi, 2010a).

Disciplinarity has been confirmed, in this study, as a comparative variable that shows differences in the organizational features of the textbook genre. This may call for a revision of the concept of textbook as a unified discourse unit. It is certainly not a monolithic entity, but if so many differences may be detected in textbooks across disciplines, the question is whether all these texts still belong to the same genre or whether they should be considered as part of a different one, for example, due to the explicit emphasis on the didactic component. It is worth noting that quantitative differences found in the frequency of occurrence of some specific steps across the four

disciplines should not be interpreted as if we were in the presence of two different genres underlying a possible 'macro-genre' called textbook. Similarly, the limited occurrence of some moves in Psychology and Social Work texts does not necessarily imply that the genre's general macro-purpose is different. The reduced presence of some rhetorical steps in the pedagogic component in SS&H texts is just a sign of disciplinary variability within a genre.

In sum, we may conclude that, based on the empirical data presented here on textbooks, the teaching/learning rhetorical devices of this genre vary from one disciplinary field to the other. This means that teaching takes place in a different manner in diverse disciplinary texts, due to the divergent nature of the disciplines themselves (Becher and Trowler, 2001; Hyland, 2004). Furthermore, there is a higher degree of abstraction in SS&H texts, which is not necessarily accumulative. So, this means that knowledge in PSY and SW is less hierarchically displayed than in BS&E, and its presentation tends to show a construct in line with co-existent alternative theories and focuses. Therefore, in SS&H textbooks, diverse theories are often presented, approaching a problem in an alternative manner and without definitely discarding any of these. The decision is, in this way, left open to the student reader. This undoubtedly entails a selection of prototypical features to the written text of the SS&H textbook genre. On the other hand, CE and IC texts clearly show devices that help to create specific conceptual knowledge and, at the same time, specific procedures of reasoning. Thus, the textbooks in BS&E revealed a way of organizing knowledge with a minor degree of flexibility. Answers included in BS&E textbooks are often limited to a strict display of information and are formulated from one viewpoint, as there exists a consensus among specialists. There are few options in the presentation of the information, and knowledge tends to become more concrete and highly accumulative, presented from paradigmatic perspectives, that is to say, a well-established and well-articulated body of knowledge (Klamer, 1990; Kuhn, 1970).

As an explanation for these differences, a distinction between concreteness and abstraction in the mode of displaying knowledge has been proposed, as well as in the modus operandi for displaying the pedagogic component. Further research would have to investigate the connections between linguistic patterns and rhetorical steps in different scientific fields.

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Appendix I. Detailed rhetoric organization of Macro-move 1. *Preamble*.

Name of move and steps	Communicative purpose	Structure
Move 1.1. Contextualization (CON)	To relate parts of the text, to comment on its contents and include acknowledgments.	Prologue/Preface
Step 1.1.1. Situating the Reader (SR)	To explain the context for the text's production.	
Step 1.1.2. Expressing Acknowledgments (EA)	To express thanks to editors, collaborators, students and others.	
Move 1.2. Contents Organization (CO)	To show the book's contents and its thematic organization.	Content Index
Step 1.2.1. Presenting the Contents (PC)	To offer a list of sections and/or parts of the contents of the book by means of a numbered list.	
Move 1.3. Resources Organization (RO)	To support the comprehension of the book's contents.	Index or Table of Symbols and Abbreviations
Step 1.3.1. Supporting Comprehension (SC)	To give a list of symbols used in the text that support comprehension.	
Move 1.4. Presentation (PRE)	To describe antecedents, context and objective of the text for the reader.	Introduction
Step 1.4.1. Declaring Textbook Purpose and Audience (DTPA)	To describe the objective and audience.	
Step 1.4.2. Describing the Thematic Nucleus (DTN)	To present the specific thematic nucleus to be discussed.	
Step 1.4.3. Giving Guidelines (GG)	To describe textbook phases, steps or stages.	

Appendix 2. Detailed rhetorical organization of Macro-move 2: *Conceptualization and Exercising*.

Name of move and step	Communicative purpose	Structure
Move 2.1. Concept Definition (CD)	To describe and explain processes, objects or others.	Nucleus of a chapter
Step 2.1.1. Linking Contents (LC)	To link new concepts or procedures with those of one or more preceding chapters.	Introduction to a chapter/section
Step 2.1.2. Presenting the Topic Nucleus (PTN)	To describe and define the object, concept or procedure under study, often accompanied by drawings, figures, tables or formulae.	Nuclei or units of a chapter/section, where a multimodal component is highlighted
Step 2.1.3. Specifying Components or Sections (SCS)	To subclassify or divide the concept or procedure under study into parts, with descriptions and definitions of types, parts or components.	Subunits of a chapter/section
Move 2.2. Practice (PRA)	To present practical tasks based on the contents reviewed in the section.	Part of a chapter
Step 2.2.1. Presenting an Exercise or Example (PE)	To present a problem, exercise or example accompanied by one or more questions directly related to previous definitions and descriptions.	Exercise-Problem-Example
Step 2.2.2. Solving the Task (ST)	To solve the problem in a concise and direct manner or propose strategies for solving it. Formulae, mathematic equations and brief explicative or descriptive phrases are used.	
Step 2.2.3. Expanding Practice (EP)	To deliver more problems or examples (without the solution)	Supplementary Exercise/Problem
Move 2.3. Recapitulation (REC)	To list global ideas.	End part of a chapter
Step 2.3.1. Macro-semantizing (M)	To sum up or define nuclear concepts, objects or procedures presented in the chapter; normally, introduced by means of vignettes.	Summary

Appendix 3. Rhetorical organization of Macro-move 3: Corollary.

Name of move and step	Communicative purpose	Structure
Move 3.1. Solutions and Answers (SA)	To point out solutions to the exercises and problems and give answers to the problems presented in each chapter.	Annexes/Appendices
Step 3.1.1. Solving and Answering (RA)	To provide solutions to exercises and answers to problems presented in each of the preceding chapters.	Annexes/Appendices
Move 3.2. Specifications (SPS)	To support comprehension of terms, units and abbreviations.	Annexes/Appendices/Glossary
Step 3.2.1. Giving Specifications (GS)	To provide a set of tables where diverse technical information is recorded.	Annexes/Appendices
Step 3.2.2. Defining Terms (DT)	To support comprehension of technical terms, presented in alphabetical order and accompanied by a brief definition.	Glossary/Key Terms/Definitions
Move 3.3. Guidelines (GUID)	To offer bibliographical sources and support the search for topics through an alphabetically ordered guideline.	Analytical Index/Bibliography
Step 3.3.1. Declaring Sources (DS)	To provide bibliographical references.	Bibliography/References
Step 3.3.2. Listing Subjects of Text in Alphabetical Order (LS)	To offer a list of the subjects of the book in alphabetical order, with indications as to their location in the text.	Analytical Index