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Triptych Approach: Cognitive, Social and Linguistic Perspectives for Analyzing Academic Writing

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Academic writing has several functions and allowing the integration of their members into different discourse communities is one of them. Students have to cope with the specialized language of their discipline from the very first steps of their educational path. The overall aim of this paper is to review some studies on the research article; we will focus on argumentation frameworks to assess their strengths and weaknesses for knowledge representation, and also two main approaches based on discourse analysis. One of them studies the internal organization of texts by means of qualitative methodologies. And the other approach focuses on language use; studies of this kind have been quantitative on a large scale, based on corpus methodologies.
In doing so, first, we highlight some gaps in the literature, and second, we attempt to show, that what we call a triptych approach to the analysis of academic writing can shed some light on the structure of the argument, the organizational pattern and the linguistic features of scientific texts written by students.

Keywords: triptych approach, academic writing, research article, argumentation, moves, clusters.

> Circe gave the potion to the sailors of Ulysses turning them into pigs, who forgot their homeland, the ability to argue (Bordes, 2011).

Academic writing has several functions: communicative, epistemic, dialogic, and constructive of social identity and social integration. The communicative function of writing allows people to discourse together, informally or formally, through publishing works in different media that persist over time (Bazerman, 2005). In an academic context it involves the transmission of knowledge to other members of a specific community, e.g. scientific community (Swales, 1990, 2004).

Academic writing also opens a problem space functioning as a tool for learning more, an epistemic tool. Writing transforms and builds

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up knowledge: a set of cognitive activities are mobilized to clarify and enrich the understanding of a topic, ideas are modified because they need to be organized and synthesized (Bereiter & Scardamaglia, 1987, Gallbraith, 1999).

Language plays a mediating role in the social construction of the mind. Thus, just as the mind is formed dialogically, texts adopt a stance of polyphony or dialogism (Bakhtin, 1981).

The writer identifies himself with a particular discourse community, therefore, social identity (e.g., as a researcher or academic author) is discursively constructed (Berkenkotter & Huckin, 1995; Ivanic, 1998; Lillis, 2001). As the writer identifies himself with a discourse community, he uses its texts as a source and these, in turn, are related to previous text by *intertextuality*[1] (Kristeva ,1980). But *intertextuality* is not just a reference to other texts; it also indicates how the writer is positioned to make his own statement (Bazerman, 2004; Prior, 2006).

Hence, writing is a medium to participate in society. From primary school (Tolchinsky & Simó, 2001) beyond university level, written language allows the integration of scholars into different discourse communities. Each community has its own discursive practices, that is, their members use written language according to certain purposes and epistemic values (Bazerman, 2004; Carlino, 2005; Ivanic, 1998; Prior, 2006).

In Catalonia, one of the autonomous communities of Spain, high school students, at the age of 17-18 years, must complete a research paper as an academic requirement of their curriculum. The research article is an outcome of guided personal research which must be submitted in a written form. This assignment allows them to develop general skills to investigate, argue and express their ideas, much like in scientific discourse communities. Further, at the university level, students must submit a research paper when they complete their master studies.

So students, from very early on, have to train their skills for research. They have to work on a problem space, that is, mobilize cognitive skills, enriching the understanding of the topic. Likewise, they must quote and use other texts (*intertextuality*) to attempt to become part of a scientific discourse community. In this attempt, the use of specialized language and genre, i.e. the language of the community of reference, is essential. The acquisition by students of the specialized language is reflected in their textual productions.

But which are the distinctive characteristics of the specialized language in research articles and how do they relate to these aspects analyzed in students' texts? We aim to show that a simultaneous use of three different approaches is useful to attain this characterization: (1) a discourse analysis focusing on the *argument structure*, that shows how writers construct the evidence in their research articles through the fundamental steps of any argument, that is, how general claims are supported by specific data through warrants; (2) an analysis of the general pattern of the organization of the research article, through its *moves* and *steps* and ; (3) a corpus-based analysis of the linguistic features, that characterize the texts, such as *clusters*, that account for the audience awareness.

This triptych approach is based, in a broad sense, on a discourse analysis perspective; discourse is a generic term, which has three dimensions: communication of beliefs (cognition), interaction in social situations and language use (van Dijk, 1997). As we focus on a specific genre, the research article, we take a genre based approach with a corpus linguistic methodology into account. By genre is meant a group of texts, which represents how writers use language in recurring situations. The cognitive dimension of genre relates to how the information is organized. In research articles knowledge is represented in

the form of arguments. The social dimension of genre relates to how the information follows the requirement of a specific discourse community (Bruce, 2008). Specifically, the use of *moves* and *steps* (Swales, 1990) which are characteristic of a particular genre relates to context or discipline-specific content. Besides the global organization realized through *moves* and *steps*, a number of linguistic features, like *clusters* may serve also as distinctive genre. Furthermore, these clusters differentiate novice from expert writers and they can give some evidence of how the awareness of audience develops.

The article is organized as follows: Firstly, we focus on argumentation frameworks. Secondly, we point out some studies that have analyzed the internal organization of texts in terms of *moves* in research articles. Thirdly, we highlight research on linguistic features, such as multi-word expressions. Fourthly, we make some remarks about our "triptych" approach.

In doing so, we attempt to show that a synergistic approach to the analysis of academic writing can shed some light on the structure of the argument, the organizational pattern and the linguistic features of research articles written by students.

1. Argumentation models

In the following lines, we present some rationale for focusing on argumentation. As pointed out by Sampson and Clark (2008) scientific inquiry is a knowledge-building process in which the development of explanations is essential, to make sense of data and, for its debate, revision and critique by the scientific community (Driver, Newton, & Osborne, 2000; Duschl, 2000). So, scientific inquiry has two steps, one is a knowledge -building process and the second is a discursive mode of argumentation that is tied to epistemic goals valued by a discipline (Sandoval & Reiser, 2004).

The whole inquiry process can be described as follows: formulating a problem or asking a question, formulating a hypothesis or answering the question, the design of the research, collecting and interpreting the data and drawing conclusions. Therefore, scientific inquiry can be summarized as a process of asking questions, generating data through systematic observation or experimentation, interpreting data, and drawing conclusions (White & Frederiksen, 1998).

Once the inquiry process has ended, the findings of the process should be communicated to the scientific community for its debate. This communication is done by means of research articles through argumentation. So, argumentation is the discursive mode directly linked to the research article to successfully inquire into any discipline. Novice members must acquire not only the ability to generate a convincing argument, that is, be consistent with the epistemology criteria used by the scientific community (Sampson & Clark, 2008; Sandoval & Reiser, 2004) but, they also have to know the formal properties and schematic structures of this kind of genre, the research article, used for the scientific communication. Therefore, below we will mention some properties of the research article (i) and then its discursive mode, the argumentation (ii).

(i) Swales (1990) defines the RA as follows:

The research article or paper is taken to be a written text (although often containing non-verbal elements), usually limited to a few thousand words, that reports on some investigation carried out by its author or authors. In addition, the research article will usually relate the findings within it to those of others, and may also examine issues of theory and/or methodology. It is to appear or has appeared in a research journal or, less typically, in an edited book-length collection of papers (p. 93).

Research articles are characterized, generally, by a fixed structure in their organizational level (macro-structure): Introduction, Method, Results and Discussion (IMRD) which follow the steps of the research process and give coherence at the rhetorical level. In the *Introduction* section the text is organized through a transition from the general topic to the particular aim,

by describing an inadequacy in previous research that motivates the present study. So, it contains the essential elements of context, focus and justification. In the *Method* and *Results* section the information is presented on a particular level: the former, detailing the steps, which were used to obtain the findings and the latter, providing evidence with the own data. The *Discussion* section like a mirror reflects the introduction section, by moving from specific findings to wider implications of the topic (Swales, 1990).

(ii) As we mentioned before, the discursive mode of the research article is commonly the argumentation. So, for the purpose of this review we clarify what we mean by argument and argumentation and its functions in academic contexts. Following Kuhn and Udell (2003) we use the term argument for the product, a piece of reasoned discourse and argumentation or argumentative discourse for the social process or activity. Science use analytical, grounded in the theory of logic, dialectical, which are part of the informal logic domain and rhetorical arguments. But dialectical and analytical, due to focusing on evidence are more exacting and representative of high quality scientific argumentation (Duschl, 2008).

Arguments like other modes of discourse, i.e. narration and exposition, have a specific structure, which accomplish a particular function, in this case, convince the scientific community. Standards such as consistency with theoretical knowledge of the discipline and the use of appropriate methods make the discourse coherent, because they respond to the expectations of the reader, the community of peers (Sandoval & Milwood, 2005). An argument has both an individual and a social meaning and there is a link between them (Kuhn, 1993).

The individual meaning refers to any piece of reasoned discourse, that is, the development of a point of view (Billig, 1987). This reflective thinking unfolds critical thinking, because it's a way to seek evidence for beliefs (Siegel, 1992). It also has a component for emancipation, as it enables students to understand themselves and the world and this provides them the capacity to transform society (Freire, 1970).

The social meaning refers to the debate of different positions between people. Argumentation that occurs in a social dialogue enhances the higher order thinking by externalizing internal reasoning (Erduran & Jiménez-Aleixandre, 2008). As argumentation puts its emphasis on claims which are supported by specific data through warrants, it enables students to develop epistemic rational criteria, because they have to choose among theories or positions and that underpins the enculturation in the scientific community (Duschl, Erduran, Jiménez-Aleixandre, Sandoval & Milwood, 2008). Epistemic practices are the ways members of a community propose, justify, evaluate and legitimize knowledge claims within a disciplinary framework (Kelly, 2008).

Despite the retreat from hard distinction between rhetoric, the study of persuasion, and dialectic, associated with ideals of reasonableness (van Eemeren, Grootendorst, Jackson & Jacobs, 1997) for our approach, we will highlight the importance of making the distinction between argumentation as *persuasion* and as knowledge *justification*. The former involves rhetorical moves and the latter commitment to evidence (Erduran & Jiménez-Aleixandre, 2008).

Argumentation as *persuasion* is related to rhetoric as it deals with arguments based on the beliefs and preferences of a particular audience. This kind of argumentation is meant to get audience acceptance by generating non-reflective emotional reactions. Therefore, as rhetoric uses the assumptions of a particular audience, it cannot be called universal and it is ineligible to be considered an ethical discipline, which means, the responsibility to be rigorous, relevant and honest (Bordes, 2011).

Instead of that, argumentation as justification addresses any audience and is universal in nature, as it tries to convince by means of reason, so it represents a commitment to evidence.

Further, Perelman and Olbrechts-Tyteca (1958) distinguished *persuasive* argumentation, which only claims validity for a particular audience, from *convincing* argumentation, that presumes to gain the adherence of every rational being and is universal in nature. For these authors the strength of the argumentation depends on the writer's knowledge and his adaptation to the audience. The writer has a mental representation of the audience to whom he addresses the argumentation. The universal audience will assent to good arguments and reject poor ones.

Hence, based on Perelman's theory that there is a close link between the writer's thinking and his representation of an audience which conditions their argumentation, in our approach we propose to separate the rhetorical moves from the argumentation structure. In doing so, we can assess through the product, the RA, some cognitive processes, such as the representation that have students of the addressee.

We would see in the moves if students have appropriated the discursive practices of a particular audience, the scientific community. And in the argumentative structure, with its justification of claims and on the coordination among claims and evidence, we would see if students have addressed to a universal audience, which implies the quality of the argument.

We will discuss the way to analyze the rhetorical moves in section 2 and in the following lines we explain some empirical research, which have described and evaluated students' arguments in their structure.

Argumentation has been recognized as an essential part of the formal educational process, because of the functions described above (Erduran, Simon, & Osborne, 2004; Kelly & Crawford, 1997; Sandoval & Reiser, 2004; Zohar & Nemet, 2002). To see how students' argumentation, in terms of quality, differs from those ideally employed by scientists, some researchers (Bell & Linn 2000; Kelly & Takao 2002) have developed analytical frameworks for examining students' argumentation in writing.

In the review made by Sampson and Clark (2008) they showed how each of the five frameworks revised by them can inform us about the quality of students' arguments. The authors used each methodology for analyzing the quality in a sample argument. We only point out three of them, those which represented the continuum, from structural to content analysis. Despite these frameworks have focused on issues of structure, content, and justification, much research on argumentation in science education have centered their attention on argument structure, in terms of the distinction of claims and justification, to determine quality. According to classical logic, an argument consists of two propositions: one of them is a set of premises, in form of statements, which are used to justify a claim: the conclusion (Bordes, 2011). But the pattern which has mostly influenced science education research is Toulmin's (1958) argument structure of claims, data and warrants.

For example, studies in the science discipline (Bell & Linn, 2000; Jimenez-Aleixandre,

Rodriguez & Duschl; 2000) which are based on Toulmin's argument pattern (1958), consider that the quality of an argument is given if it includes the following structural components: data, warrants, backing and qualifiers to show the validity of the claim. But, as the interrater reliability is hard to achieve, because the structural components could be classified into multiple categories, the usefulness of this framework for studying students' arguments in science is questionable (Duschl, 2008; Kelly, Druker, & Chen, 1998).

A significantly different way of thinking about structure is the framework presented by Kelly and Takao (2003), because it does not make a fundamental distinction in terms of claim/justification dichotomy. It distinguishes between structural components in terms of epistemic abstractness, that is, a higher level which appeals to theory within a particular domain and the connections between individual propositions, that is, lower level descriptions of data. This framework does not measure content quality directly, but it is an intermediate focus on content. The examination of epistemic status of knowledge claims could show how students adhere to the genre conventions. One limitation of the framework is that they not include appraisal of the sensibility of the links between propositions and the scientific accuracy of the propositions. The absence of these evaluations makes it difficult to determine whether students understand the theories or how well the data support the conclusions. Kelly and Takao pointed out this limitation in their own analysis (Sampson & Clark, 2008).

At the end of this continuum from structural to content analysis, there is Sandoval's scheme (2003) to analyze the quality of high school students' argumentation. It focuses on justification and content and offers a mechanical specificity in terms of content quality. He uses a software tool *ExplanationConstructor* which provided facilities for students to link data that they considered as important evidence for their claims into the text. But the subject-matter-specific nature of this framework makes it difficult to adapt to other contexts.

This research highlights the difficulties students have to engage in productive scientific argumentation. For example, they struggle with coherence and linking ideas (Kelly & Bazerman, 2003) or do not support their claims with multiple justifications (Sandoval & Millwood, 2005).

Through the review of the different frameworks made by Sampson and Clark (2008), these authors point out that the decision, if students have generated a high quality argument, depends on the framework chosen for their analysis. They state, "These differing assessments result from both the divergent foci of the frameworks in terms of relative weights placed on structure, content, and justification as well as differences in how the frameworks define structure, content, and justification" (Sampson & Clark, 2008, p.469). They also point out the need of approaches which do not focus only on atomized aspects of arguments, but also in a more holistic form, like in content, structure, epistemic and social aspects.

In the following section we focus on the rhetorical moves, which could account for social aspects like the appropriation of the discursive practices of a particular community, from a discourse perspective.

2. Discourse analysis

The term 'discourse' has received many different definitions, depending on the perspective adopted (Biber, Connor & Upton, 2007), these definitions can be grouped (Schiffrin, Tannen & Hamilton, 2001) in the following categories: 1) the study of the structure 'beyond the sentence' and 2) the study of language use .

2.1. The "Move" structure

2.1.1 The study of the structure 'beyond the sentence'

We define *text* as a "multidimensional entity that brings together the functional dimension, situational, thematic and grammar of the language "(Heinemann, 2000). The higher dimensions- functional, situational and thematic- are realized in the linguistic elements and at the same time they reveal the choices made by the writer (Ciapusco, 2005).

This definition leads us to consider the text as a polyhedral product. So, it can be analyzed from different perspectives.

The study of linguistic structures 'beyond the sentence' focuses on the lexical-grammatical features in the higher level of the sentence (e.g., paragraphs). It describes the discursive functions that perform certain words (discourse markers). These markers indicate the internal organization of discourse or text. Studies of the structure beyond the sentence are usually qualitative and they use a top-down methodology to analyze few texts and of a specific gender, because their analysis is laborious it must be done manually (Biber, Connor & Upton, 2007). The starting point, therefore, is on a macro-structural level, with the focus on the functional / communicative lengthy text units (Cohen & Upton, 2009).

As mentioned in section 1, Swales (1990) created a model CARS (Create a Research Space) after analyzing the introductory section of the papers. He found that most of their introduction sections had three moves. "A movement is a discursive or rhetorical unit that performs a coherent communicative function in a spoken or written discourse" (Swales, 2004, p.229). Analysis of movements had been developed as a top-down approach where the focus is on the study of meaning and ideas of the discourse. The model of Swales (1990) distinguishes: Move 1: establish a territory, that is, introduce the general topic. Move 2: establishing a niche within the overall theme of a more specific place. Move 3: fill the niche, the present study derived from the specific topic. However, years later, he proposed variations on this model postulates that all items are neither empirical nor are experimental (for example, Astrophysics is still in the logic of argument) Swales (2004). The *Introduction* section of a research paper is usually characterized in by the following features: an introduction of the topic or subject; a review of the previous research; an identification of the aspect not studied (gap); an explicitation of the objectives of the study; a presentation of the findings, and an explanation of the article structure (Biber, Connor & Upton, 2007).

Swales's model (1990) was used to analyze different sections of scientific papers, e.g. Kanoksilapatham (2005) analyzes the movements and lexical-grammatical features of these movements of the 4 sections (IMRD) of 60 journal articles in English biochemistry. Years later, he did the same with Thai articles and compares the results to the study done with English articles (Kanoksilapatham, 2007). He found that the two languages shared some similarities and differences; these are due to special characteristics of the expectations of the research community and in general of the Thai society. Other studies focuses on the organizational rhetoric of abstract experimental science articles in English and Spanish (Swales & Perales-Escudero, 2011, Martin, 2003) and articles on the English language compared with the French (Bonn & Swales , 2007). There are also studies that examine isolated sections from different disciplines such as biology (Samraj, 2002), computer science (Posteguillo, 1999) and medicine (Williams, 1999) (as cited in Cohen & Upton, 2009).

In the academic genre, rhetorical movements were studied in the introduction sections in

Spanish PhD theses in Computer Science (Gil, Soler & Carbonell, 2008). The results of this study reveal embedded and recurring movements that form a cyclical pattern attributable to the strategy used by students to contextualize their research.

A methodological problem of this approach is to have well-defined unit of analysis (Cohen & Upton, 2009). Identification of rhetorical moves or functions can be very subjective, and indeed this is the main criticism of this methodology. However, this subjectivity can be minimized with a high reliability among judges (Phuong Dzung, 2008). Another difficulty is to control all the variables in a cross-linguistic comparison (Swales, 2004, cited in van Bonn & Swales, 2007). This author stated that to control the variables it is better to choose publications in English, which have a low impact factor, to be able to compare them with publications with less impact, usually those of other languages.

Although there is a lot of research on the organizational structure of the individual sections of the research article in different disciplines (Dudley-Evans, 1997; Golebiowski, 1999; Lim, 2006; Samraj, 2002; Swales, 1981; Williams, 1999), there are only a few studies which attempt the article structure as a whole (Kanoksilapatham, 2005; Phuong Dzung, 2008; Posteguillo, 1999) and also which had compared the structure as a whole across disciplines (Phuong Dzung, 2008). Despite this gap it is important to account for the complete rhetorical structure of the research article (Kanoksilapatham, 2005).

Therefore, it is the goal of our triptych approach to analyze the RA in a Catalan corpus in its entirety in two disciplines, history and biology to gain greater insight of the rhetorical structure and how it evolves through the educational levels.

In the following lines we also stress quantitative methodologies, which together with the qualitative one just mentioned above, facilitate a complete analysis of RA.

2.2. The linguistic features

2.2.1 The study of 'language use'

The study of 'language use' generally addresses the issue of linguistic variation in the discourse or text. Both the study of 'language in use' and the study 'beyond the sentence' share the main focus on the linguistic form and how language structures are used for communication.

Studies of 'language use' focus on the distribution and functions of surface linguistic features. Most corpus-based studies belong to this category. These are quantitative studies that use large corpora of written texts analyzed with computational tools with usually a bottom-up methodology (Biber, Connor & Upton, 2007). First, they analyze the lexis and form and then the discourse unit types emerge from the corpus pattern.

A corpus[2] is a set of occurrences of natural texts, oral or written, kept in electronic format (Conrad, 2002). More specifically, to form a corpus of authentic texts should be collected systematically, capable of processing automatic or semiautomatic. The texts are selected according to explicit criteria to capture the regularities of a language or variety of language (Tognini-Bonelli, 2001). Beyond that, there is a distinction between corpus based approach which is an inductive approach and corpus driven which is deductive, arising from corpus. The distinction between the two terms is becoming more diffuse as they are extremes of a continuum (Corpas-Pastor, 2008).

Furthermore, corpus analysis allows accounts for the variation in the texts and the complex interactions among linguistic components. This has a practical impact, since many materials for language teaching are based on insights about the use of language. It is through studies

of corpus (Altenberg, 1994, Kennedy, 1991 and Sinclair, 1991, cited in Conrad, 1996), that we can highlight the contrast between the insights and the real patterns of use.

Many studies have used a top-down analysis of the discourse but the bottom-up approach has been developed recently for analyzing the discourse structure in studies using corpus. For example, Biber, Connor & Upton (2007) use the bottom-up approach as follows: the first step is to segment automatically the full text of the discourse in units (based on linguistic criteria). Each unit of discourse is then analyzed and classified on linguistic categories, as a result of this classification it can be described functional patterns of text. With this method it is possible to analyze the discursive patterns in large amounts of text with computational tools.

Corpus analysis not only allows the analysis of discursive patterns, as we just explained, but also the analysis of linguistic elements that differentiate novice from expert writers, such as multiword clusters and within these, those who mark the consideration towards audience. The writer includes an expert fictitious audience, allowing him to anticipate possible criticisms and interpretations of his writing. The consideration of a reader's point of view is what separates a novice writer from a mature writer (Kellogg, 2008). The consideration towards the audience is a construct, but can be measured through indicators (Hyland, 2004). The multiword clusters are a set of words that appear together, are fixed distinctive collocations of a particular genre. Clusters are not only crucial in academic writing, but also crucial to differentiate genres. Skilled writers are able to use them in a particular genre; however the absence of these clusters indicates little command in a specific genre by the novel writer (Hyland, 2008). Research on this topic highlights the considerable variation of clusters in different genres (Biber, 2006; Biber, Conrad, & Cortes, 2004; Scott & Tribble, 2006), but there is still uncertainly at how far they differ by discipline (Hyland, 2008b).

One of the main criticisms of using this methodology (corpus-based) is that it does not take into account the context of the text (Biber, Connor & Upton, 2007; Flowerdew, 2005). To counter this criticism, texts must be seen in different contexts and disciplines. It should be consider the sociocultural context in which the texts were written.

In this section we have explained that the linguistic features of discourse can be studied from two main approaches. One focuses on the internal organization of less than five texts by using qualitative methodologies. And the other approach focuses on language use, so studies of this kind have basically been quantitative, based on corpus methodologies. Combining these two approaches is a current challenge of corpus linguistics (Biber, Connor & Upton, 2007, 2012).

Conclusions

Through this review we attempt to show that is necessary to see the research paper in its polyhedral form, which could be addressed through a triptych approach. That means analyzing the cognitive dimension of genre in its argumentation schema, its social dimension in its *move structure* and its linguistics features such as audience awareness.

If research has highlighted the important role of argumentation in science and education (Lemke, 1990) and analyzing the students' texts has shed some light into the structure or into the content of students' argumentation, we require, as stated by Sampson and Clark (2008) new approaches that examine structural, epistemic and social aspects of argumentation in a synergistic way. Therefore, it is the goal of our triptych approach to focus on argumentation,

organizational structure and linguistics features to analyze a Catalan corpus of research papers from high school and university master studies to gain greater insight on how these three aspects displayed and relate and, even more importantly, how they evolve.

We called it triptych for three main reasons:

(1) It can be established as an analogy between academic writing and the fine arts. In academic communities as well as in fine arts an apprentice becomes a full member by copying, adapting and synthesizing from the work of other members (Ivanic, 1998).

(2) To some extent, a scientific text resembles a piece of art: the reader unfolds it and acquires the cognitive and social knowledge of the writer, who in turn also unfolds his knowledge while writing.

(3) As we mentioned above the triptych approach is based on a discourse analysis perspective, which merge genre based, cognitive and social, with a corpus linguistic methodology.

We agree with Sampson and Clark (2008) when they argue that analytical frameworks are tools created for specific tasks to investigate specific questions and that readers need additional information to interpret the results of a study to understand in that context what is meant by quality of argumentation.

We also share the proposal of using small, specialized corpora where the compiler is the analyst, as it allows knowing the socio-cultural context in which the texts were created (Flowerdew, 2003). Our paper suggests that all three dimensions – cognitive, social and linguistic, as well as the context under which the texts are written – are valuable in order to develop proper instructional guides. Further work needs to be undertaken in the sphere of academic writing to let an apprentice grow into a master of his trade.

[1] For a more detailed overview of *intertextuality* see Bazerman (2004) and Allen (2000).

[2] For further information about corpus see Biber, Conrad, & Reppen, 1994; Parodi, 2008; Teubert, 2005; Tognini-Bonelli, 2001.

References

1. Allen, G. (2000). *Intertextuality*. London, England: Routledge.
2. Bakhtin, M. (1981). *The dialogic imagination*. Austin: University of Texas.
3. Bazerman, Ch. (2004). Intertextualities: Volosinov, Bakhtin, literary theory, and literacy studies. In A. Ball & S. W. Freedman (Eds.), *Bakhtinian perspectives on languages literacy, and learning* (pp. 53–65). New York, NY: Cambridge University Press.
4. Bazerman, Ch. (2005). Communication in the scientific community. In S. Restivo (Ed.), *Science, technology, and society: An encyclopedia* (pp.55–61). New York, NY: Oxford University Press.
5. Bazerman, Ch., & Paradis, J. (Eds.). (1991). *Textual dynamics of the professions. Historical and contemporary studies of writing in professional communities.* Madison: University of Wisconsin.
6. Bell, P., & Linn, M. C. (2000). Scientific arguments as learning artifacts: Designing for learning from the web with KIE. *International Journal of Science Education, 22*(8), 797 – 818.
7. Bereiter, C., & Scardamaglia, M. (1987). *The psychology of written composition*. Hillsdale, NJ: Lawrence Erlbaum.
8. Berkenkotter, C., & Huckin, T. N. (1995). *Genre knowledge in disciplinary communication: Cognition/culture/power*. Hillsdale, NJ: Lawrence Erlbaum.

9. Biber, D., Connor, U., & Upton, T. (2007). *Discourse on the Move: Using Corpus Analysis to Describe Discourse Structure*. Amsterdam/Philadelphia: John Benjamins.
10. Biber, D., Conrad, S., & Reppen, R. (1998). Corpus-Based Investigations of Language Use. *Annual Review of Applied Linguistics (2008),16,*115–136. doi:10.1017/S0267190500001471
11. Billig, M. (1987). *Arguing and thinking: A rhetorical approach to social psychology*. New York, NY: Cambridge University Press.
12. Bordes, M. (2001). *Las trampas de Circe: Falacias lógicas y argumentación informal*. Madrid, Spain: Cátedra.
13. Bruce, I. (2008). *Academic writing and genre: A systematic analysis*. London, England: Continuum.
14. Carlino P. (2005). Escribir, leer y aprender en la universidad. Una introducción a la alfabetización académica. Buenos Aires, Argentina: Fondo de Cultura Económica.
15. Conrad, S. (1996). Investigating academic texts with coprus-based techniques: an example from biology. *Linguistics and education, 8,* 299–326.
16. Conrad, S. (2002). Corpus linguistic approaches for discourse analysis. *Annual Review of Applied Linguistics, 22,* 75–95. doi: 10.1017/S0267190502000041
17. Cortes, V. (2004). Lexical bundles in published and student disciplinary writing: examples from history and biology. *English for Specific Purposes, 23*(4)*,* 397–423doi:10.1016/j.esp.2003.12.001
18. Driver, R., Newton, P., & Osborne, J. (2000). Establishing the norms of scientific argumentation in classrooms. *Science Education, 84*(3), 287– 313.
19. Dudley-Evans, T. (1998). Genre analysis : a key to a theory of ESP ? *Ibérica, 2(*2), 3–11.
20. Duschl, R. (2000). Making the nature of science explicit. In R. Millar, J. Leach, & J. Osborne (Eds.), *Improving science education: The contribution of research* (pp.187–206). Philadelphia, P.A.: Open University Press.
21. Duschl, R. (2008). Quality argumentation and epistemic criteria. In S. Erduran & M. Jimenez-Aleixandre (Eds.), *Argumentation in science education: Perspectives from classroom-based research* (pp. 159–179). Dordrecht, Netherlands: Springer.
22. Erduran, S., Simon, S., & Osborne, J. (2004). TAPping into argumentation: Developments in the application of Toulmin's argument pattern for studying science discourse. *Science Education, 88*, 915 – 933.
23. Flowerdew, L. (2005). An integration of corpus-based and genre-based approaches to text analysis in EAP/ESP: countering criticisms against corpus-based methodologies. *English for Specific Purposes, 24*(3)*,* 321–332.
24. Freire, P. (1970). *Pedagogy of the oppressed*. (M. Bergman, Trans.). Harmondsworth, UK: Penguin. (Original work published 1968).
25. Galbraith, D. (1999). Writing as a knowledge-constituting process. In M.Torrance & D.
26. Galbraith (Eds.), *Knowing what to write* (pp.139–160). Amsterdam, NL: University Press
27. Gil, L., Soler, C., & Carbonell, M. (2008). The move structure of the introductory sections of spanish phd theses. *Revista Española de Lingüística Aplicada, 21,* 85–106.
28. Halliday, M.A.K. (1994). *Functions of language*. 2nd ed. London, UK: Arnold
29. Heinemann, W. (2000). Textsorten. Zur Diskussion um Basisklassen des Kommunizierens. Rückschau und Ausblick. In K. Adamzik (Ed.), *Textsorten. Reflexionen und Analysen* (pp. 9–29). Tübingen, Germany: Stauffenburg.

30. Hyland, K. (2008). Academic clusters: text patterning in published and postgraduate writing. *International Journal of Applied Linguistics*, *18*(1), 41–62 .
31. Hyland, K., & Tse, P. (2004). Metadiscourse in academic writing: a reappraisal. *Applied Linguistics, 25*(2),156–177. doi:10.1093/applin/25.2.156
32. Ivanic, R. (1998). *Writing and identity. The discoursal construction of identity in academic writing.* Studies in written language and literacy. Amsterdam,The Netherlands: Benjamins.
33. Jimenez-Aleixandre, M.,Rodriguez,M.,&Duschl,R.A. (2000). "Doing the lesson" or "doing science": Argument in high school genetics. *Science Education, 84*(6), 757 – 792.
34. Jimenez-Aleixandre, M., & Erduran, S. (2008). Argumentation in science education: An overview. In S. Erduran & M. Jimenez- Aleixandre (Eds.), *Argumentation in science education: Perspectives from classroom-based research* (pp.3–29). Dordrecht, Netherlands: Springer.
35. Kanoksilapatham, B. (2005). Rhetorical Structure of Biochemistry Research Articles. *English for Specific Purposes, 24,* 269–92.
36. Kanoksilapatham, B. (2007). Rhetorical moves in biochemistry research articles. In D. Biber, U. Connor & T. Upton (Eds.), *Discourse on the Move: Using Corpus Analysis to Describe Discourse Structure* (pp.73–119). Amsterdam/Philadelphia: John Benjamins.
37. Kellogg, R.T. (2008). Training writing skills: A cognitive developmental perspective. *Journal of writing research, 1*(1), 1–26.
38. Kelly, G. J. (2008). Inquiry, activity, and epistemic practice. In R. Duschl & R. Grandy (Eds.), *Teaching scientific inquiry: Recommendations for research and implementation* (pp. 99–117). Rotterdam, Netherlands: Sense.
39. Kelly, G. J., & Bazerman, C. (2003). How students argue scientific claims: A rhetorical-semantic analysis. *Applied Linguistics, 24*(1), 28 – 55.
40. Kelly, G. J., & Crawford, T. (1997). An ethnographic investigation of the discourse processes of school science. *Science Education, 81*(5), 533–559.
41. Kelly, G. J., Druker, S., & Chen, C. (1998). Students' reasoning about electricity: Combining performance assessments with argumentation analysis. *International Journal of Science Education, 20*(7), 849 – 871.
42. Kelly, G. J., & Takao, A. (2002). Epistemic levels in argument: an analysis of university oceanography students'use of evidence in writing. *Science Education, 86*(3), 314 – 342.
43. Kristeva, J. (1980). *Desire in language: A semiotic approach to literature and art*. New York, NY: Columbia University Press.
44. Kuhn, D. (1993). Science as argument: Implications for teaching and learning scientific thinking. *Science Education, 77*(3), 319 – 337.
45. Kuhn, D., & Udell, W. (2003). The development of argument skills. *Child Development, 74*(5), 1245–1260.
46. Lillis, T. M. (2001). *Student writing: Access, regulation, desire*. London, England: Routledge.
47. Martín, P. (2003). A genre analysis of English and Spanish research paper abstracts in experimental social sciences. *English for Specific Purposes 22(1), 25*–43.doi:10.1016/S0889-4906(01)00033-3
48. Parodi, G. (2008). Lingüistica de corpus: Una introducción al ámbito. *Revista de Lingüística Aplicada, 46*(1), 93–119.

49. Perales-Escudero, M. & Swales, J.M. (2011).Tracing convergence and divergence in pairs of Spanish and English research article abstracts: The case of Ibérica. *Ibérica 2,* 49–70.
50. Perelman, C., & Olbrechts-Tyteca, L. (1958*). La nouvelle rhétorique. Traité de l'argumentation*. Brussels, Belgium: L'Université de Bruxelles.
51. Phuong Dzung, P. (2008). How can Learning about the Structure of Research Articles Help International Students? ISANA International Educacional Association INC. Retrieved from http://www.isana.org.au/files/2008%20Conference%20Proceedings/paper_Dzung.pdf
52. Posteguillo, S. (1999). The Schematic Structure of Computer Science Research Articles. *English for Specific Purposes 18*(2), 139–58.
53. Prior, P. (2006). A sociocultural theory of writing. In Ch. MacArthur, S. Graham & J. Fitzgerald (Eds.), *Handbook of writing research* (pp.54–66). New York, NY: Guilford Press.
54. Sampson, V., & Clark, D. B. (2008). Assessment of the ways students generate arguments in science education: Current perspectives and recommendations for future directions. *Science Education, 92*(3), 447–72.
55. Samraj, B. (2002). Introductions in Research Articles: Variation across Disciplines. *English for Specific Purposes, 21*, 1–17.
56. Sandoval, W. A. (2003). Conceptual and epistemic aspects of students' scientific explanations. *Journal of the Learning Sciences, 12*(1), 5 – 51.
57. Sandoval, W. A., & Millwood, K. (2005). The quality of students' use of evidence inwritten scientific explanations. *Cognition and Instruction, 23*(1), 23 – 55.
58. Sandoval, W. A., & Millwood, K. (2008). What can argumentation tell us about epistemology? In S. Erduran & M. Jimenez- Aleixandre (Eds.), *Argumentation in science education: Perspectives from classroom-based research* (pp.71–91). Dordrecht, Netherlands: Springer.
59. Sandoval, W.A., & Reiser, B. J. (2004). Explanation driven inquiry: Integrating conceptual and epistemic scaffolds for scientific inquiry. *Science Education, 88*(3), 345 – 372.
60. Siegel, H. (1992). On defining "critical thinker" and justifying critical thinking. In H. A. Alexander (Ed.), *Philosophy of education* (pp.72–75). Urbana, IL: Philosophy of Education Society.
61. Swales, J. M. (1990). *Genre analysis: English in academic and research settings.* New York, NY: Cambridge University Press.
62. Swales, J. M. (2004). *Research Genres: Exploration and Applications.* New York, NY: Cambridge University Press.
63. Schiffrin, D., Tannen, D., & Hamilton, H. (Eds.). (2001). *The Handbook of Discourse Analysis*. Oxford: Blackwell.
64. Teubert, W. (2005). My version of corpus linguistics. *International Journal of Corpus Linguistics, 10*(1), 1–13.
65. Tognini- Bonelli, E. (2001). *Corpus linguistics at work*. Amsterdam: Benjamins.
66. Tolchinsky, L., & Simó, R. (2001). Escribir y leer a través del curriculum. *Cuadernos de educación, I.C.E.* (pp. 159–165). Universidad de Barcelona: Horsori.
67. Toulmin, S. (1958). *The uses of argument.* Cambridge, England: Cambridge University Press.
68. Upton, T.A., & Cohen, M.A. (2009). An approach to corpus-based discourse analysis: The move analysis as example. *Discourse Studies,11*(5), 585–605. doi:10.1177/1461445609341006

69. Van Bonn, S., & Swales, J. (2007). English and French journal abstracts in the language sciences: Three exploratory studies. *Journal of English for Academic Purposes,6(2),* 93–108 doi: 10.1016/j.jeap.2007.04.001
70. Van Dijk, T. (1997). *Discourse as structure and process. Discourse studies: A multidisciplinary introduction*, vol.1. London, UK: Sage.
71. Van Eemeren, F.H., Grootendorst, R. Jackson, S., & Jacobs, S. (1997). Argumentation. In T. Van Dijk (Ed.), *Discourse as structure and process. Discourse studies: A multidisciplinary introduction*, vol.1. (pp. 208–230). London, UK: Sage.
72. White, B.Y., & Frederiksen, J.R. (1998) Inquiry, modeling, and metacognition:Making science accessible to all students. *Cognition and Instruction, 16,* 3–118.
73. Zohar, A., & Nemet, F. (2002). Fostering students' knowledge and argumentation skills through dilemmas in human genetics. *Journal of Research in Science Teaching, 39*(1), 35 – 62.
74. Williams, R. (1999). Results Section of Medical Research Articles: An Analysis of Rhetorical Categories for Pedagogical Purpose. *English for Specific Purposes 18*(4), 347–66.

Триптих-подход: анализ академического письма через когнитивные, социальные и лингвистические перспективы

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Статья представляет собой обзор последних исследований в Европе и мире в области анализа научных статей с точки зрения когнитивных, социальных и лингвистических параметров.

Ключевые слова: триптих-подход, академическое письмо, научная статья, аргументация, кластеры.