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La escritura de *abstracts* y AIC de alumnos de ILE: análisis de escritos y evaluación de la efectividad de una pedagogía de género

The Writing of Abstracts and SRAs by EFL Students: Analysis of Productions and Assessment of SFL Genre Pedagogy

Trabajo de tesis presentado por Carolina Andrea MIRALLAS

Directora: Mariana PASCUAL

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ABSTRACT

Scientific writing is a very complex –albeit crucial– activity for researchers who need to share findings and become a part of, or maintain, a position as members of a wide international discourse community. Since most scientific communication happens in English, the task of writing in this foreign language for researchers in Argentinian universities is a challenge for both researchers themselves and teachers of English who need to facilitate the writing path for students. With increasing evidence of its usefulness, Genre Pedagogy has been shown to greatly improve EFL (English as a Foreign Language) writing. In this research, the Sydney School Genre Pedagogy (SSGP) approach –as offered by the Systemic Functional Linguistics (SFL) perspective– is applied to the teaching of writing, with a twofold aim. A linguistic objective is pursued in analysing student-produced abstracts and Scientific Research Articles (SRAs), with a special focus on interpersonal meanings and rhetorical components in student-produced scientific discourse. Second, this investigation assesses the effectiveness of SFL Genre Pedagogy in the teaching of one of the most important scientific genres used for the communication of findings, i.e. the SRA.

To achieve these objectives, a genre-based scientific writing course was taught to researchers in Facultad de Ciencias Físico Matemáticas y Naturales (FCFMyN) at Universidad Nacional de San Luis (UNSL) on how to write an SRA, having SSGP as the informing theoretical framework. A comparative Appraisal analysis of students' abstracts was conducted considering *before* and *after* versions. A lexicogrammatical and rhetorical description was also carried out of student-produced Titles and Introduction sections of the SRA. For the second aim, students' perceptions of the teaching cycle were collected in surveys during and after the course to assess the effectiveness of the SFL Genre Pedagogy. Students' response discourse was analysed in terms of Appraisal.

In relation to the description of students' scientific discourse, abstracts produced *after* the course display appropriate use of Appraisal resources. After-course abstracts show a larger amount of ATTITUDE and GRADUATION elements, as well as the incorporation of rhetorical components when compared with *before*-course samples. Titles written by students closely resemble the patterns and semantics of those of disciplinary sample models. Introductions exhibit highly frequent realisations used to establish and occupy the niche of investigation. In addition, there is evidence of students' increased awareness of rhetorical constituents in Introductions.

In connection with the assessment of the SSGP, students' answers to surveys show that entities of the course which were evaluated positively as "useful" include class activities, like Joint writing and Text analysis, and materials, such as language repertoires. Among negatively appraised entities, language contents and exercises can be mentioned, which were perceived as "difficult". Time was evaluated negatively as "not enough" in relation to contents taught in the course. Most students felt that they gained awareness on genre constituents of scientific texts, but they were not so positive about their ability to identify and use frequent lexicogrammatical resources in SRA constituents.

As to students' scientific discourse, we may state that students were capable of producing appropriate texts, as they deployed frequent and expected Appraisal and rhetorical constituents for abstracts and SRAs. In relation to their answers to surveys, it is possible to assess the teaching of abstracts and SRA writing through the SSGP as effective. More precisely, teacher-guided activities that are jointly carried out with students were found to be the most useful.

As a conclusion, the implementation of the SSGP for the teaching of scientific writing has been positive, making it a suitable methodology for a highly specialised audience like the one that took part in this study.

Key Words: Abstract - Scientific Research Article - Scientific Writing - Sydney School Genre Pedagogy - SFL - EFL

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TABLE OF CONTENTS

ABSTRACT	i
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	V
LIST OF GRAPHS	viii
LIST OF TABLES	ix
LIST OF ACRONYMS	xi
LIST OF APPENDICES	xii
Chapter 1. INTRODUCTION	1
1.1. Statement of the problem	1
1.2. State of the art: Studies on academic and scientific writing	2
1.3. Purpose of this investigation	3
1.3.1. General objective	3
1.3.2. Specific objectives	3
1.4. Hypotheses	4
1.5. Type of study	4
1.6. Motivation and relevance of the study	5
1.7. Organization of the thesis	5
Chapter 2. THEORETICAL FRAMEWORK	7
2.1. Genre Theory	
2.1.1. ESP	8
2.1.2. New Rhetoric	9
2.1.3. Sydney School	10
2.1.4. Justification of the theoretical positioning	11
2.2. The Sydney School Genre Pedagogy	12
2.2.1. Theoretical foundations	13
2.2.2. Evolution of genre-based literacy programs	14
2.2.2.1. Writing Project and Language as Social Power Project	15
2.2.2.2. Write it Right/the Right to Write Project	18
2.2.2.3. Reading to Learn Project	20
2.2.3. Criticisms against the SSGP	24
2.2.4. Teaching and Research on the SSGP in Argentina	25
2.3. Scientific Genres	26
2.3.1. The Abstract	27
2.3.2. The Scientific Research Article	28
2.5. Systemic Functional Linguistics	29
2.5.1. Three levels of context in SFL	30
2.5.2. Interpersonal meanings	33
2.4.2.1. Interpersonal meanings in the academic and scientific genres	34
2.5.3. The System of Appraisal	36
2.4.3.1. Appraisal Studies on Scientific Discourse	

	Appraisar studies on response and reaction texts	
Chapter 3. METHO	DOLOGY	41
21 D.d		
	Ical Intervention	
3.1.1. CO	The participants of the course	42 12
3112	Participants' research expertise and areas of interest	42
3.1.1.3.	Participants' English writing skills, experience and learning	
	expectations	43
3.1.1.4.	Materials for the course	44
3.1.2. The	e course: objectives, contents and methodology	45
3.1.3. SS	GP sequence in the course	47
3.1.4. The	e teaching of the SRA through the SSGP	48
3.1.4.1.	Writing a Title through the SSGP	48
3.1.4.2.	Writing an Introduction through the SSGP	
3.1.5. Co	nditionings and special situations when teaching the course	51
3.2. Collectio	on of data and criteria for analyses	51
3.2.1. Co	rpus 1: Students' scientific discourse	
3.2.1.1.	Corpus 1A: Abstracts - versions before the course	
3.2.1.2.	Corpus 1C: SPA sections	
3.2.1.5.	rous 2: Student and teacher reactions	
3221	Corpus 2A: Students' responses to class-surveys	
3.2.2.2.	Corpus 2B: Students' responses to end-of-course surveys	
3.2.2.3.	Corpus 2C: Teacher journals	60
3.2.3. UA	M CorpusTool	60
	-	
3.3. Methodo	ology: Summary	61
3.3. Methodo	blogy: Summary	61
3.3. Methodo Chapter 4. RESULT	ology: Summary FS AND DISCUSSION ON CORPUS 1: STUD	61 ENTS'
3.3. Methodo Chapter 4. RESULT SCIENT	ology: Summary IS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE	61 ENTS' 63
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora	Dology: Summary IS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE 1A and 1B: Abstracts <i>before</i> and <i>after</i> the course	61 ENTS' 63 63
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora 4.1.1. AT	Dology: Summary TS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE A 1A and 1B: Abstracts <i>before</i> and <i>after</i> the course TITUDE	ENTS' ENTS' 63 63
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR	Discussion ON CORPUS 1: STUD TIFIC DISCOURSE In the course In the course In the course A 1A and 1B: Abstracts before and after the course In the course In the course ADUATION In the course In the course	ENTS' 63 63 63
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec	Discussion ON CORPUS 1: STUD TFIC DISCOURSE	ENTS' 63 63 63 71 73
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab	IS AND DISCUSSION ON CORPUS 1: STUD THIC DISCOURSE 1A and 1B: Abstracts before and after the course TITUDE ADUATION stracts before and after the course: Summary	ENTS' 63 63 63 63 63 71 73 77 77
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus	Discussion on corpus 1: STUD TFIC DISCOURSE 1A and 1B: Abstracts before and after the course TITUDE ADUATION stracts before and after the course: Summary 1C: SRA sections	ENTS' 63 63 63 63 63 71 73 77 77 77 77
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 4.2.1. Tit	Doogy: Summary TS AND DISCUSSION ON CORPUS 1: STUDE TIFIC DISCOURSE In the course In the course In the course In the course I 1A and 1B: Abstracts before and after the course In the course In the course In the course ITTUDE In the course In the course In the course In the course ADUATION In the course Summary In the course In the course Stracts before and after the course Summary In the course IC: SRA sections In the course Summary In the course In the course	ENTS' 63 63 63 71 77 77 77 77
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intu 4.2.2. Space	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE 1 A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary IC: SRA sections Ies roduction	ENTS' 63 63 63 71 77 77 77 77 80
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Sec 4.3. Sec 4.4.4. Ab	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE 1 A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary IC: SRA sections les roduction A sections: Summary	ENTS' 63 63 63 71 77 77 77 77 80 86
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students	IS AND DISCUSSION ON CORPUS 1: STUD THIC DISCOURSE 1A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary 1C: SRA sections les roduction A sections: Summary ' scientific discourse: Summary	ENTS' 63 63 63 71 77 77 77 77 80 86 86
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intu 4.2.3. SR 4.3. Students Chapter 5. RESUL7	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary IC: SRA sections les roduction A sections: Summary Stracts before Summary Stracts Summary Stracts Summary Stracts Summary Stractions Stractions <t< td=""><td>ENTS' 63 63 63 63 63 63 63 71 77 77 77 77 77 77 80 86 86 86 ENTS'</td></t<>	ENTS' 63 63 63 63 63 63 63 71 77 77 77 77 77 77 80 86 86 86 ENTS'
3.3. Methodo Chapter 4. RESULT SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESULT RESPON	Discussion on corpus 1: STUD TFIC DISCOURSE 1A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary 1C: SRA sections les roduction A sections: Summary Strain Summary Station Summary Stracts Summary	ENTS' 63 63 63 71 73 77 77 80 86 ENTS' 88
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intt 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUDE IFIC DISCOURSE I A and 1B: Abstracts before and after the course ITTUDE ADUATION ction analysis stracts before and after the course: Summary IC: SRA sections les roduction A sections: Summary Steientific discourse: Summary IS AND DISCUSSION ON CORPUS 2: STUDE NSES	ENTS' 63 63 63 63 63 71 77 77 77 77 77 80 86 86 ENTS' 88 86
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT	Sology: Summary	ENTS' 63 63 63 71 73 77 77 77 80 86 ENTS' 88 88 88 88
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT	Sology: Summary TS AND DISCUSSION ON CORPUS 1: STUD TIFIC DISCOURSE Image: Stream of the course of the cou	ENTS' 63 63 63 71 77 77 77 77 77 80 86 ENTS' 88 88 88 88 88
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intt 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT 5.1.2. AT	Discussion on corpus 1: study TFIC DISCOURSE. a 1A and 1B: Abstracts before and after the course. TITUDE. ADUATION ction analysis stracts before and after the course: Summary IC: SRA sections les roduction A sections: Summary 's scientific discourse: Summary IS AND DISCUSSION ON CORPUS 2: STUDY NSES 2A: Students' responses to class-surveys TITUDE: Negative polarity	61 ENTS' 63 63 71 73 77 77 80 86 86 ENTS' 88 88 88 88 88
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT 5.1.2. AT 5.1.3. AT	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUD THIC DISCOURSE 1A and 1B: Abstracts before and after the course TITUDE ADUATION ction analysis stracts before and after the course: Summary 1C: SRA sections les roduction A sections: Summary 's scientific discourse: Summary IS AND DISCUSSION ON CORPUS 2: STUD NSES 2A: Students' responses to class-surveys TITUDE: Negative polarity TITUDE: Positive polarity	ENTS' 63 63 63 63 71 77 77 77 77 77 77 80 86 ENTS' 88 88 88 88 91 94 94
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT 5.1.2. AT 5.1.3. AT 5.1.4. Cla	Sology: Summary IS AND DISCUSSION ON CORPUS 1: STUD IFIC DISCOURSE And 1B: Abstracts before and after the course Attention Attention ADUATION ADUATION Attention Attention ADUATION Attention Attention Attention Attention Attention Attention Attention IC: SRA sections Summary Attention Attention IC: SRA sections: Summary Summary Summary Summary IS Summary Attention Summary Attention Summary Summary Summary	61 ENTS' 63 63 71 77 77 77 77 77 80 86 86 86 ENTS' 88 88 91 94 94 98
3.3. Methodo Chapter 4. RESUL7 SCIENT 4.1. Corpora 4.1.1. AT 4.1.2. GR 4.1.3. Sec 4.1.4. Ab 4.2. Corpus 7 4.2.1. Tit 4.2.2. Intr 4.2.3. SR 4.3. Students Chapter 5. RESUL7 RESPON 5.1. Corpus 7 5.1.1. AT 5.1.2. AT 5.1.3. AT 5.1.4. Cla 5.2.1 AT	Diogy: Summary IS AND DISCUSSION ON CORPUS 1: STUD IFIC DISCOURSE IA and 1B: Abstracts before and after the course Image: Course in the course in t	61 ENTS' 63 63 71 73 77 77 77 80 86 86 ENTS' 88 88 91 94 94 94 94 94

vi

5.2.2. ATTITUDE: Negative polarity	102
5.2.3. ATTITUDE: Positive polarity	104
5.2.4. GRADUATION	109
5.2.5. End-of-course-surveys: Summary	113
5.3. Student perceptions: Summary	113
Chapter 6. CONCLUSIONS	115
6.1. Summary of this research work	115
6.1.1. Findings on linguistic descriptions of scientific discourse	115
6.1.2. Contributions to the assessment of genre-based pedagogies	116
6.2. Limitations and strengths of this study	118
6.3. Possible lines of future research	119
6.4. Final comments	119
REFERENCES	121

vii

LIST OF GRAPHS

Graph 2.1. Early Language and Social Power project teaching/learning cycle (taken
from Rose & Martin, 2012, p. 64)17
Graph 2.2. Later Language and Social Power project teaching/learning cycle (taken
from Rose & Martin, 2012, p. 65)18
Graph 2.3. Write it Right teaching/learning cycle (Rothery, 1994)20
Graph 2.4. Three levels of strategies in Reading to Learn (taken from Rose & Martin,
2012, p. 147)
Graph 2.5. Context and language stratification in SFL - adapted from Halliday and
Matthiessen (2014)
Graph 2.6. An overview of Appraisal resources (Martin & White, 2005)
Graph 2.7. Delicacy in the system of ATTITUDE (Hood, 2010)
Graph 3.1. Corpus composition
Graph 3.2. Summary research objectives and data sources
Graph 4.1. An extended model of the domain of Appreciation for the analysis of
scientific genres (Waicekawsky, 2016)68
Graph 4.2. Semantic areas identified within the subsystem of Valuation
Graph 4.3. Sections in abstracts before (1A) and after (1B) the course
Graph 4.4. Summary of results for Corpus 1
Graph 5.1. GRADUATION of linguistic contents of the course
Graph 5.2. GRADUATION of rhetorical contents of the course
Graph 5.3. GRADUATION of activities presented in the course
Graph 5.4. Summary of results for Corpus 2

LIST OF TABLES

Table 2.1. Genres and stages in the first phase of research (Rose & Martin, 2012)	2) 15
Table 2.2. Rothery's initial genre teaching sequence (Rose & Martin, 2012)	16
Table 2.3. Genres and stages described in the Write it Right project	
Table 2.4. Nine sets of strategies for integrating reading and writing	22
Table 2.5. SFL metafunction/strata matrix of resources for text analysis (tak	ten from
Martin, J.R. (forthcoming) Systemic Functional Linguistics)	
Table 3.1. Students' perceived level of their English skills	44
Table 3.2. Summary of contents and objectives of the course	45
Table 3.3. Corpus composition summary	52
Table 3.4. Features analysed in SRA sections	57
Table 3.5. Class-surveys collected	58
Table 3.6. Question types in the end-of-course survey	60
Table 3.7. Summary of the corpora collected	61
Table 4.1. ATTITUDE in Corpora 1A and 1B	64
Table 4.2. Valuation and entities appraised in Corpora 1A and 1B	67
Table 4.3. Polarity and Explicitness in Corpora 1A and 1B	69
Table 4.4. GRADUATION in Corpora 1A and 1B	71
Table 4.5. Scale of Force in Corpora 1A and 1B	72
Table 4.6. Scale of Focus in Corpora 1A and 1B	73
Table 4.7. Comparison of sections identified in Corpora 1A and 1B	74
Table 4.8. Title patterns found in students' collected corpora	78
Table 4.9. Semantics expressed in Titles (Corpus 1C)	78
Table 4.10. Title patterns in Corpus 1C	79
Table 4.11. Rhetorical moves and steps in Corpus 1C: Introductions	80
Table 4.12. Lexicogrammatical features in Corpus 1C: Introductions	
Table 5.1. ATTITUDE in Corpus 2A: Class-surveys	
Table 5.2. Explicitness of ATTITUDE in Corpus 2A: Class-surveys	91
Table 5.3. Entities appraised negatively in Corpus 2A: Class-surveys	92
Table 5.4. Entities appraised positively in Corpus 2A: Class-surveys	94
Table 5.5. Activities appraised positively in the class-survey	95
Table 5.6. ATTITUDE in Corpus 2B: End-of-course surveys	99
Table 5.7. Explicitness of ATTITUDE in Corpus 2B: End-of-course surveys	101

Table 5.8.	Entities appraised negatively in Corpus 2B: End-of-course survey1	02
Table 5.9.	Entities appraised positively in Corpus 2B: End-of-course survey1	05
Table 5.10	• Activities appraised positively in Corpus 2B: End-of-course survey 1	07

LIST OF ACRONYMS

CELEX	Centro de Lenguas Extranjeras		
EFL	English as a Foreign Language		
FCFMyN	Facultad de Ciencias Físico Matemáticas y Naturales		
LERN	Literacy and Education Research Network		
NESB	Non-English Speaking Backgrounds		
SFL	Systemic Functional Linguistics		
SLATE	Scaffolding Literacy in Academic and Tertiary Environments		
SRA	Scientific Research Article		
SSGP	Sydney School Genre Pedagogy		
TLC	Teaching-Learning Cycle		
UNSL	Universidad Nacional de San Luis		

LIST OF APPENDICES

- **Appendix 1:** Formal documents of the course
- Appendix 2: Class journal entries
- **Appendix 3:** Materials of the course
- Appendix 4: Surveys and students' responses
- Appendix 5: Students' productions
- **Appendix 6:** Systems used for analyses

1.1. STATEMENT OF THE PROBLEM

The perception of writing that prevails in young researchers –and even in researchers with ample experience in the production of scientific papers– is that it is a difficult and complicated process (Bitchener & Basturkmen, 2006). Writing becomes an even more complex task when this needs to be done in a foreign language. Almost 90% of scientific communication is in English (Hyland, 2006; Swales, 1997), but this is not the mother tongue of academics in Argentina. In this scenario, knowledge of this language is paramount if Argentinian researchers intend to become members of the international scientific community.

Therefore, we face a situation which needs concrete proposals to provide English as a Foreign Language (EFL) advanced undergraduate students, teachers and researchers with the required skills, linguistic abilities, and rhetorical tools to be able to produce the genres that are highly valued in their context of investigation. If this is done successfully, then they will be able to effectively participate in the international sphere, and actively interact and communicate with their peers. Researchers at Universidad Nacional de San Luis (UNSL) are in immediate need of writing in English, for they have received little, if any, formal instruction on scientific writing, since most of their tuition has been done in relation to a completely different, though still essential, skill, which is reading comprehension.

Although research on writing in academic contexts has grown significantly over the last years, this increase has not been so in the same proportion in EFL writing (Matsuda & De Pew, 2002; Paltridge, 1993). It is, consequently, of great interest to carry out further studies in these contexts. This work attempts to make a contribution to this aim, and is based on the conviction that writing skills can be improved with specific pedagogical interventions. The writing methodology implemented in this work is the Sydney School Genre Pedagogy (SSGP onwards) (Halliday & Martin, 1993; Hyon, 1996; Martin, 2009; Martin & Rose, 2008), within the framework of Systemic Functional Linguistics (SFL onwards).

The Sydney School has developed a Pedagogy which has been described as an empowering tool that serves to provide the most disadvantaged sectors of society with the linguistic elements that enable them to be socially successful. Having this in mind, the macro-purpose of this work is to contribute to the teaching of writing in English to scientists in Argentina, for they are in a disadvantaged position when compared to others for whom English is their mother tongue or the language used as a means for instruction in all educational levels.

1.2. STATE OF THE ART: STUDIES ON ACADEMIC AND SCIENTIFIC WRITING

There are several regional studies that have been carried out in relation to EFL writing of academic and scientific texts. In the investigation project at the Foreign Languages Center (CELEX) at UNSL (2006-2010), and the following project (2010-2013), the development of genre competence has been researched to improve the transmission of knowledge in several languages, particularly in English. The 2014-2017 project *Discourse Analysis: Perspectives, resources and contributions for institutional discursive practices* pays special attention to how discourse and genres are enacted in both academic environments and the social media. Also, at Universidad Nacional de Cuyo, there has been a focus on the description of genres and their application in classrooms, based on the Sydney School Pedagogy (Boccia, et al., 2013).

At the national level, two main investigation lines related to academic and scientific writing can be mentioned. In Universidad Nacional de General Sarmiento, research has been conducted in relation to academic writing and SRAs lexicogrammatical realizations (Moyano, 2007). Also, Susana Gallardo and her collaborators have taught several courses on scientific writing at the *Centro de Divulgación* at Universidad de Buenos Aires, while Ann Montemayor-Borsinger (2001, 2005) has focused her interest in thesis and scientific writing. In Latin America, Parodi (2010) has compiled some teacher-research works in connection with academic and professional literacy, and reading and writing for different disciplines (Psychology, Social Work, Industrial Chemistry, and Construction Engineering).

In the international context, many investigations have been carried out with an SFL Genre Pedagogy theoretical basis, particularly in Australia. Works have been mainly related to the teaching of writing for adults who are immigrants (Feez, 2002), in high schools, and at the workplace (Frances & Martin, 1997). Other studies are in connection to scientific disciplines (Korner, McInnes, & Rose, 2007), principally in high schools (Martin, 2006; Martin & Rose, 2005; Rose & Martin, 2012; Rose, 2005; 2007). In addition, during the late 1980's, the Literacy and Education Research Network (LERN) was founded, which is devoted to developing instruction approaches for the

teaching of a variety of genres. Working on a genre pedagogy in higher education, the Scaffolding Literacy in Academic and Tertiary Environments (SLATE) Project (2015) –carried out by James Martin, along with Shoshana Dreyfus, Sally Humphrey and Ahmar Mahboob– has involved action research that has resorted to and extended the existing work on genre pedagogy to an on-line learning environment. In particular, this latter project explores how genre-based pedagogy can be used to support the academic literacy development of Non-English Speaking Background (NESB) students in tertiary educational institutions to develop their academic literacy practice.

Finally, the international literacy program *Reading to Learn*, which is directed by David Rose, has the aim of designing a writing pedagogy to enable students to succeed with the writing demands of academic environments, and involves collaborators all around the world (Rose & Martin, 2012). This program supports every student in a class so that they can read and write challenging texts at their grade level.

Although many studies on EFL literacy based on genre pedagogy can be found regionally, nationally and internationally, there is still much research to be done, particularly in a strategic area like the teaching of scientific genres to the academic community in San Luis, Argentina.

1.3. PURPOSE OF THIS INVESTIGATION

The aim of this investigation is to contribute to the assessment of the effectiveness of a specific Genre Pedagogy –the one proposed by the Sydney School– when applied to the teaching of writing. In addition, this research also serves a linguistic purpose, which is to describe students' scientific discourse.

1.3.1. General objective

The objective of this work is twofold: to describe the language of scientific discourse produced by a group of EFL researchers and advanced postgraduate students at UNSL, and to assess the effectiveness of a Genre-based pedagogical implementation in the teaching of scientific writing.

1.3.2. Specific objectives

a. To determine the effectiveness of the SSGP in the teaching of abstract and SRA Title and Introduction writing to advanced undergraduate students and teacherresearchers at FCFMyN.

- b. To describe students' perceptions of the methodology of a scientific writing course taught applying the SSGP.
- c. To compare students' abstracts produced before and after the course.
- d. To define the lexicogrammatical elements that are employed by students when writing abstracts, with a specific interest in interpersonal meanings.
- e. To establish whether students use linguistic and rhetorical elements presented in the course in their SRA Introductions.
- f. To identify positive and negative aspects of the implementation of a Genre-based scientific writing course for future pedagogical applications.

1.4. Hypotheses

- a. Teaching how to write abstracts and SRA Titles and Introductions through the SSGP to advanced undergraduate students and teacher-researchers at the FCFMyN is effective.
- b. Students' perceptions of the methodology of the scientific writing course taught applying the SSGP are positive.
- c. Students' productions after the course evidence the incorporation of some rhetorical elements and linguistic features when compared to abstracts written before the course.
- d. Students tend to use Appreciation resources in their scientific discourse.
- e. Students employ a range of linguistic and rhetorical elements presented in the course in the writing of abstracts and SRA Titles and Introductions.
- f. Students are able to identify class components that are positive, as well as those that need improvement.

1.5. Type of study

The study here intended follows some of the principles of *action research*, which is not about creating experimental conditions to compare the effect of a treatment, but about evaluating an alternative approach (Dörnyei, 2007). In this case, the method under assessment is the pedagogical cycle proposed by the SSGP for the teaching of writing. Due to the close link between research and teaching, this work is conducted with a natural group of students, and in cooperation with other teachers. The ultimate goal is, on the one hand, to gain a better understanding of the educational environment in which we work, and, on the other, to improve the effectiveness of our teaching.

Additionally, this study is qualitative because students' productions and their

perceptions on the course have been described in terms of the Appraisal System, within the SFL framework (see section 2.5.3 *The System of Appraisal* below for further details). This type of analysis involves the observation of the lexicogrammatical elements employed, the determination of the evaluative weight they have, and a classification of the resources, according to the subsystems proposed in the Appraisal System. Moreover, a manual analysis has been carried out on student texts to identify rhetorical components in the abstracts and SRAs.

In combination with the qualitative study described above, a quantitative perspective has also been considered here, for it substantially contributes to the aims of this work. Appraising lexicogrammatical resources as well as rhetorical elements have been quantified to facilitate analyses and descriptions, and to provide valuable tangible evidence for interpretations.

1.6. MOTIVATION AND RELEVANCE OF THE STUDY

If we bear in mind that English is not the mother tongue of researchers in Argentina, added to the fact that most scientific productions published in international journals are in this language, we face investigators' vital necessity to be provided with linguistic tools that enable them to successfully participate in the international publication sphere. The pedagogical teaching cycle presented in this research might represent a contribution towards satisfying the need of those who are in a disadvantaged position when compared to others whose native language is English.

This research applies the writing cycle proposed by the SSGP as an attempt to help peer researchers at UNSL improve their written productions, so that they can ultimately participate in the international scientific community. This study is relevant in terms of the determination of the efficacy of a teaching method in the scientific and university contexts, for producing SRAs responds to institutional requirements. Additionally, the teaching of a course on scientific writing satisfies researchers' needs to improve their writing skills in EFL. Finally, the very fact that I decided to orient my efforts to evaluating the effectiveness of a Genre approach entails the belief that this type of instruction is useful.

1.7. ORGANIZATION OF THE THESIS

I have begun this work with an introductory chapter on the statement of the main concern that motivated this research: the need of Argentinian investigators to be able to write in English, and have stated the research objectives and hypotheses. In Chapter 2, I present some regional and international antecedents related to this research, as well as its theoretical framework. This includes Genre Theory, scientific genres, Systemic Functional Linguistics, the Appraisal System and a review on studies which have deployed reaction texts as sources of data. Then, in Chapter 3, the methodology is explained, both in terms of the pedagogical application of the SSGP and the analysis of students' productions. In Chapters 4 and 5, results and discussions are presented for the two corpora, that is, scientific discourse and response texts. Finally, Chapter 6 synthesises the main contributions of this study and suggests lines for further research.

Chapter 2. THEORETICAL FRAMEWORK

In order to achieve the objectives stated in Chapter 1, i.e. to assess the effectiveness of a Genre-based pedagogical implementation in the teaching of scientific writing, and to describe the language used in participants' productions, I have resorted to three main areas of knowledge that best contribute to the theoretical framework that guided this work. In the following section, I present contributions on academic and scientific writing from Genre Theory in general, and from the Sydney School of Genre Pedagogy in particular. Additionally, I mention linguistic features that current research has provided on the two scientific genres under analysis in this piece of work: the abstract and the SRA. Finally, the last section of this chapter presents the principles from SFL and the System of Appraisal that have guided this thesis.

2.1. GENRE THEORY

Genres are socially recognised recurrent forms of language which tend to be used in similar contexts. In the last twenty five years, there has been an increasing interest in Genre, Genre Pedagogy and the ways in which we understand discourse and literacy (Hyon, 1996; Hyland, 2004). Genre approaches, both in terms of the description of text formats and the application of this knowledge to teaching, have transformed education in different contexts around the world (Hyland, 2002). Knowledge on this arena is wellgrounded on research carried out on authentic texts, and it has informed theories of language and teaching from a social and situated perspective.

The growing impact that the genre movement has had around the world has called for research on the effectiveness of genre pedagogies in instructional environments. These widely studied approaches have been shown to contribute to a great extent to raising students' awareness of the social purposes of texts, as well as to helping students gain insights into disciplinary contexts and ideologies (Burgess & Cargill, 2013; de Olivera & Lan, 2014; Gardner, 2012; Wingate, 2012; Yasuda, 2011).

The teaching of writing based on genres has been implemented in Argentina, especially in the teaching of academic genres in Spanish, with positive results. Within the framework of a project financed by the Education and Science Ministry of Argentina, Language teachers at universities and secondary schools learned about text analysis and preparation of learning materials for the development of writing skills. The materials were implemented and later evaluated. Teachers stated that genre-based writing allowed them to have a different relationship with their students as they introduced academic genres sine students had the chance to negotiate texts (Moyano, 2005). More importantly, students' productions showed large improvement both in terms of the grammar used and the organization of the texts, the quality of the information provided and the progression of topics. The explicit presentation of genre components and linguistic features, and their relation to the social purposes that texts pursue, has contributed not only to the understanding of the ways in which texts function, but also on students' critical analysis of the semiotic processes that take place in genres (Amaya, 2013).

With abundant evidence that the implementation of genre-based teaching of writing in the national context is beneficial for students (Moyano, 2004; 2005; 2011; 2013), three main theories that inform genre descriptions and practices for the teaching of scientific writing will be described here: English for Specific Purposes (ESP henceforth) (Flowerdew, 1993; Hopkins & Dudley-Evans, 1988; Swales, 1990; 2004), the New Rhetoric (Bazerman, 1988; Freedman & Medway, 1994), and the SSGP (Feez, 2002; Martin, 1999; Martin & Rose, 2005). From these three theories, this work is framed within the Genre theory as defined by SFL. Since all three schools are connected to the topic of genre, they will be briefly reviewed in turns. After this revision, I justify the choice for the framework selected and expand on the Sydney School Genre Theory's main tenets for the pedagogy applied in the writing course.

2.1.1. ESP

The ESP school has been mostly interested in deploying genres as tools for the teaching of the language necessary for nonnative speakers of English for academic and professional contexts (Bhatia, 1993; Flowerdew, 1993; Hopkins & Dudley-Evans, 1988; Swales, 1990). Genres are viewed as "communicative events" (Swales, 1990, p. 58) whose linguistic conventions are framed and defined by their formal characteristics, such as their "patterns of structure, style, content and intended audience" (Swales, 1990, p. 58), and by their communicative purposes within social contexts.

The analysis of texts as genres has mainly focused on two aspects. On the one hand, one line has followed the description of *moves*, which refers to the overall organizational patterns in genres and SRAs sections such as Introductions (Bhatia, 1997; Samraj, 2002), Methods (Miin Hwa Lim, 2006), Discussion (Hopkins & Dudley-Evans, 1988; Parkinson, 2011; Swales, 1990), Results (Brett, 1994; Bruce, 2009;

Phuong Le & Harrington, 2015), and Conclusions (Ruiying & Allison, 2003). On the other hand, another line of investigation has studied *grammatical features* at the sentence level such as tenses, passive voice, hedges and tentative language (Salager-Meyer, 1992; Swales, 1990; Tarone, Dwyer, Gillette, & Icke, 1998).

The contexts in which ESP genre theory has been applied are classrooms with English for specific and academic purposes. The main objectives have been to teach genre structures and grammatical features that are required for foreign speakers of English to master in order to be academically and professionally successful (Hyon, 1996), and to help students be able to control the style and organization of texts, following the models and constraints provided by instructors. Structures and features are made explicit, and the analysis of models contributes to the development of writing.

The ESP school has provided descriptions of genres as models for writing, but there has not been a development of a pedagogy, a methodology, or even a set of techniques or activities to be carried out in the classroom. However, some efforts have been carried out to the aim that students be trained in techniques of text recognition and analysis (Flowerdew, 1993), so that they can identify the conventions of genre. Such is the case of Swales and Feak's (1994) *Academic Writing for Graduate Students*, which provides models of rhetorical forms aimed at improving students' productions.

2.1.2. New Rhetoric

Studies emerging from the New Rhetoric school reflect an approach that is quite different from the ESP school, and they refer to a group of North American researchers who have devoted themselves to thoroughly describing the contexts in which genres occur. Representatives from the New Rhetoric school are mainly concerned with L1 teaching, including composition studies and professional writing.

Genres have not been in the main agenda of study of the New Rhetoric, as the focus has been on the social purposes that texts have and the actions that genre performs in different situations (Bazerman, 1988; Freedman & Medway, 1994). Miller (1984) describes *genre* centring around the notion that a definition of this term should be on the action it is used to accomplish, and not on the very substance or the form: "genre study is valuable not because it might permit the creation of some kind of taxonomy, but because it emphasizes some social and historical aspects of rhetoric that other perspectives do not" (p. 151). Genres within the New Rhetoric are analysed in the recurrent situations in which they occur.

Bearing in mind the fact that New Rhetoric studies have focused on the sociocultural aspects of genre, it is expectable to see that the focus has been less on teaching texts than on the role that genres have in helping students and professionals to understand the social functions of texts (Miller, 1994). This line of thought has mainly influenced North American college and university education, where English is the mother tongue to most students attending these institutions.

Bazerman (1988) states that writing pedagogies should not give students the formal aspects of the genres they have to work with, but rather should enhance students' understanding of the essence of texts. In this sense, knowledge of the social context is determinant for writers to choose the rhetoric that is appropriate for that situation. Observation of samples and understanding the contexts of occurrence of genres are activities carried out in classrooms, while explicit language tuition is scarce. The New Rhetoric school has lacked explicit instructional frameworks for teaching students language and functions of academic and professional genres (Hyon, 1996).

2.1.3. Sydney School

The Australian genre theory has developed and evolved quite independently from the ESP and the New Rhetoric schools. This theory is found in the context of a much larger linguistic theory, that of SFL, which is concerned with the relationship between language, function and meaning in social environments. Genre as presented from the perspective of the Sydney School shares much common ground with ESP and New Rhetoric genre research, mainly the social world, academic and professional fields of interaction, and notions of context. However, it is the comprehensively developed theory of language and a well-grounded and sound pedagogy for the teaching of genres that justify my choice for taking this theory as the framework for this research.

Concerned about the relationship among form, social function, meaning and context, SFL proponents have focused on the taxonomy of genres and on the linguistic features characteristic of school, professional, non-professional, workplace, academic and scientific genres. This concern on sentence-level features, as well as on global text structures, is a distinguishing feature that makes this school different from ESP and the New Rhetoric. Genres are defined as "recurrent configurations of meanings [...] that enact the social practices of a given culture" (Martin & Rose, 2008, p. 6), and the basic idea is that we –as users of the system of language– cannot attain our social purposes at once, but rather, have to move in steps, assembling meaning as we go. According to

Martin (2009), when a text is complete, we will have achieved our goal.

The Sydney school has differed from the ESP and New Rhetoric traditions in that applications of genre teaching have been with children and adolescents (primary and secondary schools), aborigines, and adult migrants at workplace contexts. Because these groups of people were not prepared to produce a certain range of texts necessary for their functioning in society, genre experts have developed a new approach to literacy education. Genre-based pedagogy has influenced the entire educational system, and thus, some teaching and training programs have been instituted by the Australian government and the industrial spheres (Feez & Joyce, 1995). Tertiary and university training, nevertheless, has not received as much attention as the aforementioned sectors.

One of the main goals of the SSGP is constructing a reading and writing pedagogy within the SFL model of language and context (Martin J. R., 1999) in which the relationship of meaning and language "is theorised, rather than intuited" (Hood, 2010, p. 31). This theory of language has been taken as the backbone in the design of the SSGP teaching pedagogy (Martin & Rose, 2005; Rothery, 1996), which involves a schema for sequencing tasks, leading students to write various genres on their own.

2.1.4. Justification of the theoretical positioning

All three schools have presented different forms of classroom considerations. The ESP school is well grounded on the description of moves in genres, particularly of academic and scientific ones, which are the focus of study in this piece of work. Actually, the ample theory developed within this school is useful when presenting students with the rhetorical purposes of sections of texts, and this information has been presented and discussed in some of the classes of the writing course.

In the case of the New Rhetoric school, and important as descriptions of context may be, this theory does not fully offer the resources needed for this research work. Since the context of instruction is teaching Argentinian academics how to write in English for international publication, what is necessary in their training is the description of the language and how language is used to express meanings. These learners are experimented researchers who are very well aware of the situations in which genres occur. Rather, their weaknesses are related to their linguistic limitations.

Overall, the aims of the three Genre-based pedagogies described above have a major concern about helping students become more successful readers and writers of academic and professional texts. Hammond (1987) states that "what [genre-based]

programs have in common is, first of all, an emphasis on the function and meaning of language in context" (p. 172). Nevertheless, this work takes the SSGP as the framework to sustain the practices to teach scientific writing.

The two main reasons for choosing the SSGP over the others are its sustained theoretical framework of learning, and its deployment of SFL's comprehensive and thorough description of language as a system. First, teaching activities provide students with the skills they need to succeed in their writing, and tasks are the central elements. SSGP provides teachers with well grounded-teaching techniques and activities to accompany students in their learning process. Second, this pedagogy is sustained by a comprehensive theory of language. There is an emphasis on explaining text features, and on resorting to the Hallidayan SFL schemes of linguistic analysis. Genre is but only one aspect to a more comprehensive social semiotic theory of language and context. SFL relates meaning and language, and this relationship is theorised, explained and modelled in a tri-strata system which provides a vast array of tools that enable linguists to describe the ways in which language is used.

New Rhetoric and ESP have not been as ideologically charged as the SSGP in their discussions of genre-based teaching. This might be due to the fact that most of the learner groups in their focus are mainstream undergraduate, graduate students and professionals who may not be perceived as needing the same degree of empowerment as some underprivileged groups of Australian populations. Additionally, Australian genre literacy reflects a concern over social inequality, and the way this translates into educational literacy. SSGP has always established a strong partnership with primary, secondary and adult schoolteachers, some of whom may not work in academic and scientific environments. This connection has led to the development of pedagogical models, like the LERN teaching learning cycle, and other classroom materials and instructional frameworks that implement genre based pedagogy.

In what follows, I present a review of how the Sydney School genre-based pedagogy has evolved to become what it currently is. Then, special attention is paid to the description of the tasks proposed within this framework for the teaching of genres.

2.2. THE SYDNEY SCHOOL GENRE PEDAGOGY

The term "Sydney School" was first coined by Green and Lee (1994) to refer to the work in language and education carried out in Australia, where James Martin was working at that moment. This name caught on internationally quite fast (Freedman & Medway, 1994; Lee, 1996; Martin, 2000; Rose, 2008; 2011) although work following the same theoretical principles has been going on in locations such as the UK, China, South Africa and North and South America.

The original set of teaching strategies designed to help students with schooling genres was known as "genre-based pedagogy", which then was extended as "genre pedagogy". The SSGP started developing in Australia in the 1980s, while at that moment, this country was a nation of immigrants who had been born overseas and whose native language was not English. There was also an enormous cultural debt with Indigenous people, who had been dispossessed of their land and largely oppressed by British immigrants (Rose & Martin, 2012).

2.2.1. Theoretical foundations

The initial aim of this pedagogy (Rose & Martin, 2012) was to enable students to deal with the writing demands at school. Although work began in primary schools, it extended to secondary institutions and education for immigrants. Particularly central to this pedagogy is the belief that effective teaching involves providing learners with explicit knowledge about the language and how it works.

Teaching literacy inexorably involves teaching language, and, in connection to a "language based theory of learning", Halliday (1993b) states:

When children learn language, they are not simply engaging in one learning among many; rather, they are learning the foundation of learning itself. The distinctive characteristic of human learning is that it is a process of making meaning -a semiotic process; and the prototypical form of human semiotic is language. Hence, the ontogenesis of language is at the same time the ontogenesis of learning" (p. 97).

Teaching any subject involves teaching it *through* language, and teaching reading and writing also requires teaching *about* language, in order to be able to discuss language and how it works.

Apart from this conception of literacy, a problem that linguists and educators identified with the widely-spread theory of learning of constructivism is that it has served the interests of middle-class groups, and marginalised groups' possibilities have been undermined. Immigrant, working-class and indigenous children did not have a knowledge basis on which to build their reading and writing abilities, which constructivism presupposes. These groups did not bring to school all the personal experiences that children from other sectors had already acquired. Within traditional constructivist theories, students are given tasks which are just above their independent

competence, and therefore, high-achieving students are given more difficult tasks at each step, while low-achieving students are given less difficult tasks, as compared to the first ones. Over time, there is no other possible effect but for the gap between the two groups to increase.

Genre writing emerged, then, as an original approach to explicit literacy learning, democratization of the outcomes of education systems (Bernstein, 1979), and to make the distribution of knowledge in schools more equitable. In the SSGP, leaning happens through doing *tasks*, which may vary from very simple and physical activities such as learning how to tie our shoelaces to complex ones, such as the semiotic activity of learning knowledge from textbooks. Since the task is considered to be the core of any learning activity, students participate actively in tasks proposed by teachers. There are some tasks that only a portion of the students will be able to carry out without any help of the teacher, and these students can be found at a higher level of knowledge and abilities.

The approach from the SSGP is to make the entire language-learning task explicit so as to build knowledge about both the language and the content (Rose & Martin, 2012). The principle is that all students in a class need to accomplish the same level of task, and teachers need strategies to support all groups equally. In genre pedagogy, the nature of each learning task is analysed, and a sequence of such tasks is designed so that all students are able to fulfil each one successfully. With the help and guidance of the teacher, completing planned tasks at a higher level is a more effective method of acquiring skills to reduce the gap between high and low achieving students. To this aim, SSGP has designed teaching techniques (presented in 2.2.2.3 on page 20 below) that can be applied to different grade levels, age groups, contexts and subject areas.

2.2.2. Evolution of genre-based literacy programs

The SSGP has not always been what it is today, for it has evolved through different phases for more than thirty years. With the linguistic contribution derived from Michael Halliday's works, the sociological perspective of Basil Bernstein, and the institutional leadership of Frances Christie, the project has become the *Reading to Learn* project. In the following section, a recount is made in connection with the different phases that the genre literacy project has gone though in the SFL framework, beginning with the *Writing Project* and *Language as Social Power Project*, followed by *the Write it Right/The Right to Write Project*, and the *Reading to Learn Project* (Rose & Martin,

2012).

2.2.2.1. Writing Project and Language as Social Power Project

Main contributions to the evolution of the theory are attributed to Joan Rothery's initial developments in the 1980s, who engaged SFL theory in primary schools classroom practice, Brian Gray's efforts in developing programs for indigenous children in Australia, Gunther Kress' collaboration in the area of genre and politics of literacy, Bill Cope and Mary Kalantzis' work with the Literacy and Education Research Network (LERN) project, and Mike Callaghan, Sue Doran and John Carr's engagement in the implementation of genre-based syllabi (Rose & Martin, 2012). Work at the *Writing Project* mainly focused on a description of the writing that was found in Australian primary schools, the range of genres that students were required to comply with to be successful at school (comments, recounts, reports, descriptions, explanations, procedures, argumentations and narratives). Such description involved the name of genres linked to their social purposes and technical terms for the identification of their stages (see Table 2.1 below).

	Genre	Purpose	Stages
	recount	<i></i>	Orientation
		recounting events	Record of events
			Orientation
	normativa	resolving a complication	Complication
	narrauve	resolving a complication	Evaluation
rie.			Resolution
Sto	anadata	sharing an amotional reaction	Orientation
•1	anecuote	sharing an emotional reaction	Remarkable event
			Reaction
			Orientation
	exemplum	judging a character or behaviour	Incident
			Interpretation
	description	describing specific things	Orientation
	description	describing specific unings	Description
	report	classifying and describing general things	Classification
xts			Description
Ter	explanation	explaining a sequence of events	Phenomenon
lal	explanation		Explanation
ictr		how to do an activity	Purpose
Fa	procedure		Equipment
			Steps
	protocol	what to do and not do	Purpose
	protocor	what to do and not do	Rules
nts			Thesis
	exposition	arguing for a point of view	Arguments
me			Reiteration
ma			Issue
Ar	discussion	discussing two or more points of views	Sides
			Resolution

 Table 2.1. Genres and stages in the first phase of research (Rose & Martin, 2012)

In the *Language as Social Power Project*, a model of language lessons was developed so that teachers could use it to plan and deliver their writing. It was at this point in the evolution of the SSGP that the widely-spread definition of "genre" came into being, as Martin and Rose (2012) state in their book *Learning to Write, Reading to Learn*:

We came to formulate our characterisation of genres for teachers as "staged, goal oriented, social processes" – **social** because we are inevitably trying to communicate with our readers (even if they do not immediately read or respond to our work), **goal oriented** because we always have a purpose for writing and feel frustrated if we do not accomplish it, and **staged** because it usually takes us more than one step to achieve our goals." (bold as in the original) (p. 54).

This is one of the most frequently quoted definitions of *genre*, which was originally intended for teachers and adapted for their understanding, even if they did not come from an SFL background. It was intended for a non-linguist public, and though slightly simplistic in nature, this definition has guided the work of many researchers and teachers around the globe.

Joan Rothery was the first to translate the fundamental notion of the SSGP of *guidance through interaction in the context of shared experiences* into a teaching practice. Her first sequence of steps is displayed in Table 2.2.

1	Introducing a genre	Modelling a genre implicitly through reading and by
1	introducing a genie	class
2	Focusing on a genre	Modelling a genre explicitly by naming its stages
		Teacher and class compose the genre under focus; the
3	Jointly negotiating a	teacher guides the composition of the text through
	genre	questions and comments that provide the scaffolding
		for the stages of the genre
		Selecting material for reading, note making and
4	Researching	summarising and assembling information before
		writing
5	Drafting	A first attempt at writing the genre under focus
		Teacher-pupil consultation. Direct reference to the
6	Conferencing	meanings of the writer's text; getting "into the text", not
		standing next to it
7	Dublishing	Writing a final draft that may be "published" for the
/	Fuorisining	class library

Table 2.2. Rothery's initial genre teaching sequence (Rose & Martin, 2012)

The sequence above was reformulated so that it could be entered at different points, and stages could be recycled, depending on the needs of students. A Teaching-Learning Cycle (TLC) was developed with the contributions of Rothery, Macken-Horarik, Cope, Kalantzis, Kress and Martin, and it was revised by Murray and Zammit



Graph 2.1. Early Language and Social Power project teaching/learning cycle (taken from Rose & Martin, 2012, p. 64)

The main steps involve *Modelling*, *Joint negotiation of the text* and *Independent construction* of the text (Rose & Martin, 2012). Modelling sets the genre in its cultural context, and teachers and students discuss stages and language features. Joint negotiation of texts involves building up the field. Finally, in the Independent construction, students make suggestions, and the teaching adapts these comments to include them in the text written on the board. In this last stage, students submit a draft for consultation and, with the help of the teacher, they edit their texts for publication. The whole cycle can be repeated for the students' benefit if needed.

The cycle in Graph 2.1 was revised by Murray and Zammit (1992) into the following:



Graph 2.2. Later Language and Social Power project teaching/learning cycle (taken from Rose & Martin, 2012, p. 65)

The main stages in this cycle consist of Deconstruction (which is the Modelling stage in Graph 2.1 with the added value of "critical thinking"), Joint construction, Independent construction, and a fourth stage: Negotiating field. This last stage was added to signal the importance of shared experience on the subject matter when teaching genres.

2.2.2.2. Write it Right/the Right to Write Project

This phase of the project took place in the 1990s, and involved a team of collaborators doing research in language, education and genres which are expected to be read and written by students at secondary schools and by adults at workplaces (Rose & Martin, 2012). Among some of the contributors in this stage, we could mention Robert Veel, Mary Macken-Horarik, Sally Humphrey, Caroline Coffin, Susan Feez, Maree Stenglin, Jon Callow and Katina Zammit.

In this stage of the research, school genres and stages were further specified (Table 2.3) and described, and the TLC shown in Graph 2.2 above was refined into Graph 2.3 (on page 20).

Genre		Purpose	Stages
Stories	recount	recounting events	Orientation Record of events
	narrative	resolving a complication in a story	Orientation Complication Resolution
	exemplum	judging a character or behaviour in a story	Orientation Incident Interpretation
	anecdote	sharing an emotional reaction in a story	Orientation Remarkable event Reaction
	autobiographical recount	recounting life events	Orientation Record of stages
nicles	biographical recount	recounting life stages	Orientation Record of stages
Chro	historical recount	recounting historical events	Background Record of stages
	historical account	explaining historical event	Background Account of stages
	sequential explanation	explaining a sequence	Phenomenon Explanation
tions	conditional explanation	alternative causes and effects	Purpose Equipment Steps
Explan	factorial explanation	multiple causes for one effect	Phenomenon: outcome Explanation: factors
н	consequential explanation	multiple effects from one cause	Phenomenon: cause Explanation: Consequence
Sa	procedure	how to do experiments and observations	Purpose Equipment Steps
cedur	protocol	what to do and not do	Purpose Rules
Pro	procedural recount	recounting experiments and observations	Purpose Method Results
	descriptive reports	classifying and describing a phenomenon	Classification Description
eports	classifying report	classifying and describing types of phenomena	Classification Description: types
Я	compositional report	describing parts of wholes	Classification Description: parts
Arguments	exposition	arguing for a point of view	Thesis Arguments Reiteration
	discussion	discussing two or more points of views	Issue Sides Resolution
SS	personal	expressing feelings about a text	Evaluation Reaction
Text Response	review	evaluating a literary, visual or musical text	Context Description of text Judgment
	interpretation	interpreting the message of a text	Evaluation Synopsis of text Reaffirmation

 Table 2.3. Genres and stages described in the Write it Right project



Graph 2.3. Write it Right teaching/learning cycle (Rothery, 1994)

In this version of the cycle, setting context and building field are positioned as key concerns of each stage. The goals of this literacy methodology are to enable students to have control of the genres they work with and to become more critical of them.

2.2.2.3. Reading to Learn Project

The third stage in the project (Rose & Martin, 2012) has involved the cooperative work of a network of teachers who have applied the developments of genre-based pedagogy in classrooms. Their aims have been to design a methodology for integrating reading and writing with learning in primary, secondary and tertiary education, and to extend the applications derived to teacher education. Researchers and teachers working at this phase of the project include Kate Mullin, Claire Acevedo, Sarah Culican, Lyndall Harrison, and Cheryl Coop, among others.

In this third generation of the SSGP, two main components have been incorporated and specified: the design of classroom interactions for reading (*Preparing for Reading, Detailed Reading and Sentence Making*), and the development of strategies for writing genres such as stories, factual texts and arguments (*Joint construction, Joint Rewriting and Spelling; Individual Construction, Individual Rewriting and Sentence Writing*). This learning/teaching cycle incorporates both skills –reading and writing– so each will be described in turn.

2.2.2.3.1. Reading and Writing Strategies:

In the case of reading tasks, there is an explicit emphasis on building field understanding of texts and on teacher planning in order to provide students with the maximum support. Since in the view of SSGP parent-child interaction is the principal way in which we learn language, it is of utmost importance to constitute a reading model that follows the frequent strategies employed by parents to teach their children oral language. From this, the following set of principles has been derived for developing a reading pedagogy (Rose & Martin, 2012, p. 146) (bolds as in the original):

- reading involves four levels of meaning: **decoding** words from their latter patterns, **identifying** meanings within sentences, **inferring** connections across a text and **interpreting** relations to the social context of a text.

- children learn to read through explicit guidance by caregivers and/or teachers.

- guidance takes highly predictable cycles of interaction in which the parent **focuses** attention on a feature of the text, the child **identifies** the feature and the parent **affirms** their response. The parent may also **prepare** the child by saying what to look for, and may **elaborate** with further information after reaffirming the child's response.

- elaborations may be interactive, in which the parent asks a **focus** question, the child **proposes** a response from their experience, and then the parent **affirms**, and may further **elaborate**.

- classroom interactions follow similar patterns to the ones already described.

- reading development occurs over time.

These principles have guided the design of a genre teaching/learning cycle, shown in Graph 2.4, which is a further development of Graph 2.3:



Graph 2.4. Three levels of strategies in Reading to Learn (taken from Rose & Martin, 2012, p. 147)

The first level is directly connected to how we plan our curriculum programs, and to the texts we select for teaching and for evaluating what students have learnt. From

Levels	a. Reading	b. Joint Writing Strategies	c. Individual Writing Strategies
Level 1	Preparing for Reading	Joint Construction	Individual Construction
Level 2	Detailed Reading	Joint Rewriting	Individual Rewriting
Level 3	Sentence Making	Spelling	Sentence Writing

this, nine sets of strategies are derived and can be summarized as shown in Table 2.4.

Table 2.4. Nine sets of strategies for integrating reading and writing

In level 1, the focus is on the structure of whole texts in both skills, reading and writing. In level 2, a higher level of support is provided for a detailed comprehension and production, and the language interest is on patterns of meanings within and between sentences. Level 3 provides maximum support for students to develop foundation skills in reading with understanding, spelling and writing.

a. Reading:

All lesson sequences start with **Preparing for Reading** (Rose & Martin, 2012). Using this strategy, students can be guided to read any and all texts in the curriculum. First, students are given enough *background knowledge* to understand and access the text. Second, students listen to the teacher as he/she gives a step-by-step *summary* or preview of the text's content. This provides support for students to follow a challenging text, whether it is narrative, factual or argumentative. This strategy allows teachers to work with texts that may be well beyond some students' independent reading levels, and there is no need to avoid challenging texts if some students cannot read them independently. Any text can be read with guidance, and when the text is read in the *Detailed Reading*, weaker students do not need to struggle with understanding.

The second level enables all students to read a short text with complete understanding. In **Detailed Reading**, a short passage is selected from the reading text. The teacher reads the text aloud, and once the whole text has been read, he/she guides students sentence-by-sentence through the passage in the following manner (for an example of this, see Appendix 2, 3rd meeting, p. 9, and 4th meeting, p. 16) (my bolds):

- teacher **prepares** students with a summary of the content that is included in the sentence.

- teacher reads the sentence, as presented in the text.

- teacher provides a **position cue** for students to localize in the text the answer to the question that is coming, such as *at the beginning of the sentence, there are four words*.

- teacher **asks** a question such as *Can you see the four words that express the time when the events happened?*

- students **focus** their attention and answer. Since they know which words the teacher is referring to, any student –even the weakest ones– can answer something

like Once upon a time.

- teacher affirms and praises the correct answer of the students.
- the teacher **directs** students to highlight the words.
- the teacher elaborates on the meaning of the highlighted word/s or segments.

While the students identify and highlight groups of words as they go, the focus is on the patterns of language within and between sentences, which prepares students to use those patterns in their own writing. This activity takes quite a long time, so short passages with the most elaborate resources are selected. Students highlight segments of language in their texts as the teacher asks questions and the students answer.

One or more sentences are selected from the Detailed Reading passage, and written on cardboard strips for students to cut up and manipulate in **Sentence Making** activities.

b. Joint Writing Strategies

Joint Construction is the strategy for guiding all students to write successful factual, narrative or argumentative texts. With factual texts, notes are taken while reading, and the teacher then guides the class to write a new text from the notes. With stories and persuasive texts, a model of the genre (text type) is used to show its structures. The teacher then guides the class to construct a new text with the same structure as the model.

Joint Construction is focused on using the global structure of model texts, preparing students to write whole texts with that structure. The teacher then guides the class through **Joint Rewriting** of this passage, borrowing the same sophisticated language patterns from a literary text, or detailed content from a factual text. Students then practise the same task in Individual Rewriting.

Words are then selected from these sentences for **Spelling**. The teacher guides students to cut these words up into their letter patterns, and to practise writing them on small whiteboards.

c. Individual Writing Strategies

In **Individual Construction**, students write their own texts, guided by the teacher, using the same notes for a factual text, or following the same model for a story or argument.

Detailed Reading and Rewriting focus on the patterns of language within and among sentences, preparing students to use those language patterns in their writing. Detailed Reading and Rewriting are usually done before Joint Construction, as they facilitate the application of these language patterns in the jointly constructed text. This
helps prepare students to use both the language patterns and text structure in **Individual Writing** tasks.

Once they can spell words accurately, students then write them in whole sentences, in the **Sentence Writing** activity. These foundation skills are practised on the same texts that the class is reading in their curriculum. All the above strategies can be used for whole classes or individual support.

2.2.2.3.2. Stories as the set of techniques for the teaching of the SRA

Each set of strategies described in 2.2.2.3 has been developed for three distinct kinds of texts: stories, whose main purpose is to engage readers and help writers become creative while borrowing patterns of language; factual texts, aiming at building field knowledge of writers and informing readers; and arguments and text responses, oriented at evaluating issues and texts. The sequence illustrated in this section is the one that has been developed for the first type of text, which is *stories*, even when at first sight one might think that *factual* texts would be more suitable for the teaching of abstracts and SRAs. This methodological choice has been made taking into consideration the fact that science genres, such as the ones in focus in this study, are defined as story genres by Martin and Rose (2008) themselves (p.130). The set of techniques to be employed for the course were those of the story genre because the aim was to help researchers and teachers at UNSL to improve their writing skills as they report the narration of how the investigation was carried out.

2.2.3. Criticisms against the SSGP

It has been claimed that the SSGP, with its special focus on explicit language teaching, constrains an individual's freedom and creativity (Hyon, 1996). The insistence on guidance and relying on sample texts to guide the reading for writing is said to lead students into copying patterns of texts, instead of creating their own.

However, the systematic exploration of the language used in texts and the way it expresses meanings are essential phases in a learning cycle. First, it is necessary for students to understand how texts work and how they are created in order for them to acquire knowledge of the genre, before they can actually be creative and challenge the ways in which texts are realised. Additionally, the rejection of a systematic teaching on how the language works and on student's acquisition of metalanguage forces both teachers and students to rely on implicit and tacit knowledge about the linguistic system (genre, register, meanings, grammar, lexis, morphology and phonology as a whole). Another piece of criticism against the SSGP is that the teaching-learning cycle –focusing on modelling and construction of texts which are socially relevant in school contexts– represents a "transmission pedagogy" that uncritically presents texts and excludes non-mainstream genres "that might be culturally important in students' lives" (Cope & Kalantzis, 1993, p. 15). Cope and Kalantzis –initial founders of the LERN project– have insisted on students' need to learn different genres, not in a duplication manner, but rather to help them master genres as tools to encourage change and disruption, rather than simply reinforce reproduction (p. 245).

Similarly, Christie (1991b) proposes that teaching students about genres and language in general is an ideological matter of social justice, insisting that "as long as we leave matters of language use available to some and not to others, then we maintain a society which permits and perpetuates injustice of many kinds" (p. 83). In addition, Rose and Martin (2012) state that:

On the one hand, we decided as an issue of social justice that it was important to make the genres required for success in education and life beyond school as widely available as possible. On the other hand, we concluded that a critical perspective on genre depended on both mastery of the genres being critiqued and mastery of the genres being used to critique (p. 67).

Rose and Martin firmly believe that it is not possible for students to be able to be creative and critical of genres if they are not first instructed on what purposes genres serve and what linguistic features constitute them. This is, precisely, the reason why this teaching method was selected: its aims to empower students by providing them with both genre and language knowledge.

2.2.4. Teaching and Research on the SSGP in Argentina

There are a few studies in Argentina related to the teaching of writing through the SSGP, mainly in Spanish for academic environments, such as those carried out by Estela Moyano (2005, 2011, 2013). In one of her studies, Moyano (2005) adapted the SSGP to teach academic writing to first year students at university. Some aspects under evaluation in students' production were selection of information, text development, use of the system of reference, connectors, construction of experiential meanings and verb tenses, among others. It was found that students made evident progress in grammatical, textual and discourse aspects. Considering her results in another study, Moyano (2011) proposed that when students become aware of the semiotic resources for the construction of knowledge in their disciplines in the wider context of science, their

reading and writing skills, as well as their understanding of contents, improve substantially. Finally, Moyano (2011) has shown that when students carry out the Joint deconstruction stage of texts as proposed by the SSGP, they reflect upon the linguistic resources available for the specific context in which they have been used. All in all, there are positive results when the SSGP is implemented for the teaching of reading and writing in Spanish, which is the mother tongue of the students under consideration. This work makes a contribution in the teaching of English, which is a foreign language in Argentina, for the teaching of scientific writing.

2.3. SCIENTIFIC GENRES

Two of the most intensely studied genres with varied foci of interest are the abstract and the Scientific Research Article. The description of both genres has largely been made in terms of their rhetorical structure and moves. Within the SFL framework, genres in the sciences have been described by Martin and Painter (1986), Martin (1989), Lemke (1990), Martin (1990), Halliday and Martin (1993), Halliday (1993c), Rose (1997), Unsworth (1997a; 1997b; 1997c), Veel (1997), Wignell (1997), Lemke (1998), Rose (1998), Martin and Veel (1998), Veel (1998), and Christie and Martin (2007), among others. SFL work in this area has attempted to explain the different stages of genres, together with lexical and grammatical choices that "construct the function of the stages of the genres" (Rothery, 1996, p. 93).

Science, in the SFL perspective, is a group of semiotic practices concerned with manipulating material activities or other semiotic objects (like language, for example). Science, therefore, "semioticises the natural world by generalising about things and processes in four regular ways: by classifying and describing phenomena, by explaining how processes happen, by instructing how to observe phenomena (e.g. in experiments), and by recounting and interpreting what was observed" (Martin & Rose, 2008).

Taking into consideration the fact that SFL defines genre as a recurrent semantic configuration (see 2.1.3 above), the abstract and the SRA can be defined as macro genres whose social purpose is to facilitate the control of the natural world (Martin & Rose, 2008). Martin and Rose (2008) present the "genres of science" (p.130) as *story genres*, which are constituted by related genres and steps that can be distinguished as they unfold along a text. Unlike other narratives, chronology is not used to organise scientific reports, but rather, the text develops around entities, explanations or discussions. From this perspective, and in order to apply the SSGP teaching sequence,

both the abstract and the SRA are not simply presented as texts that are made up by their constitutive components, but rather as genres with recurrent semantic configurations.

2.3.1. The Abstract

Much research has been carried out to provide tools for writers to produce abstracts, to establish their linguistic characteristics and to define their rhetorical organization (Salager-Meyer, 1992; Van Bonn & Swales, 2007). In connection with writing training, Swales and Feak (2009) provide scholars with the skills to produce abstracts for short communications, conferences, and PhD dissertations. They also cover keywords, titles, author names, and language exercises.

Concerning the language description of abstracts, there has been an increase in the interest of interpersonal language. Hyland and Tse (2005) studied the linguistic resources used by academic writers to adopt a position and engage with readers. They looked at frequencies, forms and functions of *evaluative that*, and concluded that this is an important resource to provide author comment. They affirm that abstracts are not just pale reflections of the full-length articles, and that interactional metadiscourse in abstracts has undergone important changes in the past 30 years. Also looking into interactional discourse, Gillaerts and Van de Velde (2010) analyse interpersonality elements in abstracts such as hedges, boosters and attitude markers. Moreover, Cutting (2012) described conference abstracts in terms of vague language, and found that this resource is employed to express incompleteness of the research of both collection of the data and determination of results. Finally, Van Bonn and Swales (2007) explore how and why language choice might affect abstracts, and describe personal pronoun use, sentence length and transition word selection. They explain that choices related to these linguistic features can be aligned with expectations as to what constitutes appropriate academic style.

Regarding the schematic structure of abstracts, Samraj (2005) found that disciplinary variation in academic writing is not just manifested in generic structure, but also in the relationship among science genres such as the abstract and the SRA. Additionally, Lorés (2004) reported the analysis of SRAs abstracts from linguistics journals considering rhetorical organisation and thematic structure, and identified IMRD and CARS type patterns. Also related to this, Martín (2003) explored the extent to which there is rhetorical variation between abstracts written in English and in Spanish in

the area of experimental social sciences. He found that Spanish abstracts largely follow the international conventions based on the norms established by the English-speaking international academic community.

2.3.2. The Scientific Research Article

A great deal of attention has been placed on the analysis of SRAs, the central and most widely known form of knowledge communication. It is the focus of attention of linguists worldwide since it is the main genre for distributing and advancing scientific knowledge. The SRA represents, in Hood's terms (2010), "a high-stake text type across all disciplines, constituting the primary means by which academic knowledge is disseminated" (p. 6).

A number of authors have considered SRAs in a variety of scientific fields like medicine (Li & Ge, 2009; Nwogu, 1997; Williams, 1999), sciences (Berkenkotter & Huckin, 1995) or social studies (Holmes, 1997). The micro-level of SRAs has been described in terms of lexis (Chen & Ge, 2007; Martinez, Beck, & Panza, 2009) and grammar (Halliday, 1993b; Master, 1991), for both pedagogical and research reasons.

In relation to titles, even though this section is small if compared to a whole SRA, it has a decisive role to attract a potential reader's attention, and this is why it has received considerable attention. Haggan (2004) studied titles in the fields of science, literature and linguistics to identify what components writers use when they want to transmit knowledge, and what grammatical structures are used (full sentences, compound structures or noun phrases). She found that noun phrases are the most frequently used structures, which have a number of post-modifiers that provide precision as to the focus on the reader; compound structures tend to be composed by a noun phrase indicating a general topic, followed by an expanded phrase in which the particular aspects of that general topic are dealt with, while full sentences are not frequently used, except for the field of Biology. Wang and Bai (2007) focused on the syntactic structures used in English titles of medical SRAs and found that the noun phase, with a number of postmodifiers, was the most frequently used structure in this discipline. Soler (2011) has also studied the structural construction of titles SRAs and review papers, both in English and Spanish. Noun phrases were also found to be the most frequent structure in all disciplines, except for Biology, which displayed a higher number of sentences when compared to other disciplines.

The macro-structure analysis of SRAs' sections has also been the focus of

exhaustive analysis; Swales (1981; 1990) described the rhetorical moves of the different sections of the SRA (IMRD: Introduction, Methods, Results, Conclusions), focusing on the Introduction section. In addition to SRAs overall schematic structure, each move has also been the focus of analysis of different authors: Introductions (Bhatia, 1997; Samraj, 2002), Methods (Miin Hwa Lim, 2006), Discussion (Hopkins & Dudley-Evans, 1988; Parkinson, 2011; Swales, 1990) and Results and Conclusions (Brett, 1994; Bruce, 2009; Ruiying & Allison, 2003; Swales, 1990; Thompson, 1993).

The SRA has been described from a series of perspectives, all contributing to throw light on it analysis to help students and researchers become more successful readers and writers of academic texts. The New Rhetoric school has focused on the situational contexts in which SRAs occur (Bazerman, 1994; Berkenkotter & Huckin, 1995; Freedman & Medway, 1994; Myers, 1989). The ESP school has paid more attention to detailing the formal characteristics of SRAs' organizational patternings (Dudley-Evans, 1986; 1994) as employed by specific discourse communities (Bhatia, 1993; 1997; Swales, 1990; 2004). Finally, the SFL school has paid a large amount of attention to the SRA with initial works by Halliday (1993a; 1998; 2004) and his followers (Cortés, 2004; Hassan, 2002; Martin, 1997; Martin & Rose, 2008; Ruiying & Allison, 2003; Ruiying & Allison, 2004).

SFL views the SRA as a story genre, more precisely, as a procedural recount whose function is to facilitate the control of the natural world. Science, in Martin and Rose's view, is "a set of semiotic practices; it is concerned with manipulating material activities, [which] are informed by what science has to say about the world" (2008, p. 135). In line with SFL's definition of genre as a recurrent pattern of meanings, a broad generalisation is made that science genres semioticise the natural world in four regular ways: by classifying and describing phenomena, by explaining how processes happen, by instructing how to observe phenomena (e.g. in experiments), and by recounting and interpreting what was observed (Martin & Rose, 2008, p. 138).

2.5. Systemic Functional Linguistics

Systemic Functional Linguistics is a social semiotic theory which describes language in use (Halliday & Matthiessen, 2014), and this characterization entails all the strata at the linguistic as well as at the contextual levels. Within the perspective of SFL, language is a system of meanings. SFL is interested in what people do when they use language to construct meanings. Grammar, therefore, is the study of how meanings are

expressed as users choose specific lexicogrammatical elements. Language is described as a system of choices from which speakers and writers select lexical and grammatical units, but they do so in specific situations, as the language they use is influenced by the complexities of different levels of context. The most immediate context of the situation, or Register, has constraining effects on language, and language often develops conventions and patterns that tend to be repeated, which become socially recognized and accepted forms or Genres.

Two essential aspects of the SFL approach are that it tries to answer the question of how people use language, and of how language is interpreted functionally, that is, how it is structured for use (Eggins, 2004). The systematization with which language is theoreticised constitutes a very valuable set of tools to carry out text description, as this enables analysts to bring light to texts. Another important feature of this systemic functional approach is its insistence on studying actual instances of text that have been used by speakers or writers.

In SFL theory, language is said to be functional, since its function is to make meanings, and systemic, because language is described as a system of choices that have the potential to express three kinds of simultaneous strands of meanings. As users, we can express interpersonal meanings (related to interactive exchanges), textual meanings (language used to organize language) and ideational meanings (representation of the world and experiences, and the logical relations that link those experiences). This conception of language as a system of resources provides EFL students with the possibility to view language from a tripartite vision. The three metafunctions of language and their associated meanings are explicit as to why a text is the way it is, when and how we use language to negotiate social relations, how we manage flows of information and how we represent reality.

2.5.1. Three levels of context in SFL

SFL proposes a three-level organization of context: Context of Situation or *Register*, Context of Culture or *Genre*, and Ideology (Martin, 1992). These levels range from the most immediate context of situation or Register, which is explained in terms of three variables (Halliday & Matthiessen, 2014): Field (the action going on and the domain, subject matter or topic to which the activity relates), Tenor (who takes part in the interaction and the role relationships between interactants, and Mode (the role played by the language in the situation). Then, the mediate level of context is that of

culture, or Genre. This has been defined as a recurrent configuration of meanings (Martin, 1984, p. 25) or patterns of language patterns (Rose & Martin, 2012). Finally, the most abstract level of context is Ideology, which is the mind-set or world-view of speakers which informs and controls all the language they produce (Hasan, 2009). As shown in Graph 2.5 below, these strata are represented in three concentric circles:



Graph 2.5. Context and language stratification in SFL - adapted from Halliday and Matthiessen (2014)

In SFL, context is theorised as the abstracted realm of meaning realised in and by language and other semiotic modalities, and the contextual and linguistic levels are systematically related through levels of realisation, as shown in Table 2.5.

Metafunction Stratum	Ideational	Interpersonal	Textual
Genre (Martin & Rose, 2008)	Orbital/Serial structure	Prosodic structure	Periodic structure
Register (Martin J. R., 1992; Halliday & Martin, 1993)	<i>Field</i> Activity sequences, participant taxonomies	<i>Tenor</i> Power, solidarity	<i>Mode</i> Action/reflection, monologue/dialogue
Discourse Semantics (Martin & White, 2005)	Ideation, external conjunction	Appraisal, negotiation	Identification, internal conjunction, information flow
Lexicogrammar (Halliday & Matthiessen, 2014; Kress & van Leeuwen, 2006)	Transitivity; nominal group classification, description, enumeration	Mood, modality, polarity, comment, vocation, person	Theme and information, tense and deixis, ellipsis and substitution
Graphology/Phonology (Halliday & Greaves, 2008)	Tone sequence	Formatting, emoticons, colour, tone, voice quality, phonaesthesia	Punctuation, layout, tonality, tonicity

Table 2.5. SFL metafunction/strata matrix of resources for text analysis (taken from Martin,J.R. (forthcoming) Systemic Functional Linguistics)

As a text is explored, meaning is analysed in terms of Field, Tenor, Mode, and Genre. Different from other perspectives, SFL explains system networks of genres which identify how genres resemble each other and are different from one another, and how Register variables determine the meanings to be expressed, and the lexicogrammatical choices within the systems of Transitivity, Mood and Theme that users make to realise those meanings.

From the enormous array of possible linguistic aspects to analyse in the production of participants in this study, and the detailed systematization that the SFL perspective provides to describe them, I mainly focus on interpersonal elements. Although both genres under study in this work –the abstract and the SRA– are usually considered to be descriptive, they display numerous evaluative instances. It is of considerable importance to recognise the value that interpersonal elements have in the presentation of new knowledge (Hood, 2010; 2012) and in the interaction among members of the scientific community. These meanings represent a special difficulty to EFL learners, and this is why they have been the focus of interest of many linguists like Hood (2010; 2012), Hyland (2004), Pascual and Unger (2010), and Swales (1990; 2004) among many others. This is the reason why, when describing students' scientific discourse, interpersonal meanings became the focus of this analysis.

Additionally, a few studies have been carried out at the intersection of

interpersonal meanings and response texts, showing that this type of linguistic analysis on opinion texts has great potential to contribute to assessing pedagogical implementations of a variety of techniques and tools. In her doctoral dissertation, Huffman (2015) used open-ended survey responses on the use of automated writing softwares, which were studied under the light of Appreciation resource analysis (Martin & Rose, 2003). Martín, Helale and Faletti (2012) and Ballard, Becker, and Smith (2017) have also deployed interpersonal meanings, especially the System of Appraisal, to describe students' productions in portfolios and in teachers' feedback's responses. Since interpersonal meaning analysis has not been extensively applied on response text, this work makes a contribution in this line. The discourse in students' class and end-ofcourse surveys in open-ended questions is described under the light of the Appraisal System, particularly under the subsystem of ATTITUDE with the purpose of identifying what components of the course students value positively and negatively.

2.5.2. Interpersonal meanings

As stated in the previous section, language expresses interpersonal meanings through a wide variety of linguistic resources. Halliday (1978) views the grammar of interaction from a semantic perspective since whenever we use language to communicate, one of the activities we do with it is to establish a relationship with another participant.

Interpersonal meanings can be analysed in different layers. At the lexicogrammatical level, the system that realizes the interpersonal metafunction of language is MOOD. This involves choices in terms of the basic speech roles (giving/demanding information/goods and services, and four primary speech functions of offer, command, statement and question), choices in terms of polarity opposition, choices of intermediate positions, and degrees of indeterminacies. At the level of discourse semantics, the system that describes interpersonal meanings is that of Appraisal, fully described in 2.5.3 The System of Appraisal.

Interpersonal meanings perform several essential functions in academic and scientific discourse, as interpersonal language enables speakers to present their opinion about the world and value systems, to engage in dialogue and interact with others, and at the same time, to regulate meanings into different degrees. In the following section, a review is made in terms of research from a variety of linguistic perspectives on evaluative meanings in science genres.

2.4.2.1. Interpersonal meanings in the academic and scientific genres

Academic and scientific written productions are popularly considered to be objective in their representation of research processes. The general understanding of writing in the academic and scientific arenas has traditionally been that of objectivity with an emphasis on the use of neutral language. However, the expression of opinions and assessments is an intrinsically human feature, and a large amount of the work that academics actually do is to evaluate. Scientific writers need to take a clear position in relation to a number of elements in the research and publication processes as they have to justify a chosen methodology of investigation, present results in a convincing manner and express their position in relation to other authors.

Research is a constant subjective selection of a portion of reality, a segment which the scientist chooses to study, the comparison of methods, and the prosecution of a specific set of research questions. All these choices are –in the view of a researcher– more relevant than other whole different universes of possibilities. There is a constant judgment on what samples are representative, which results are significant and how results relate to those of others. Presenting evaluation in a text entails providing personal judgments and appealing to a community's norms and values. Indeed, the main goal of scientific reports is persuasion; that is, to convince the academic community to accept the new knowledge claims (Hood, 2012).

Investigations on evaluative language in the science genres have grown significantly over the last few years, and they address the idea that writers take a position on something, at the same time that they entice others to do the same. Research has been undertaken under various headings, such as 'evidentiality' (Chafe & Nichols, 1986), 'affect' (Ochs, 1989), 'point of view' (Simpson, 1993), 'hedging' (Hyland, 1998), 'evaluation' (Hunston, 1994; Thompson & Hunston, 2000a), 'stance' (Conrad & Biber, 2000; Hyland, 2005); and 'appraisal' (Martin, 2000a; Martin & White, 2005).

Central to academic writing are interpersonal meanings such as negotiation, the use of affective and expressive language, citations, the presence of the author in the SRA, and the assessments of one's and others' findings. According to Hyland and Diani (2009, p. 1), "research and publishing is a constant process of comparing methods, assessing sources, weighing up outcomes, contrasting claims and considering data." When describing the social creation of knowledge, Hyland (2004, p. 6) states that:

It is naïve to regard texts as accurate representations of what the world is like because this representation is always filtered through acts of selection, foregrounding and symbolization; reality is seen as constructed through processes that are essentially social, involving authority, credibility and disciplinary appeals.

Therefore, evaluation can be regarded as an essential component of research. Thompson and Hunston (2000a, p. 5) define evaluation as a "broad cover term for the expression of the speaker or writer's attitude or stance towards, viewpoint on, or feelings about the entities or propositions that he or she is talking about." The meanings expressed are essentially interpersonal, for these build up a shared point of view between speakers and writers and hearers and readers. Evaluation is concerned with interpersonal uses of language and how the subjective presence of the writer or speaker becomes evident to convey an attitude to both those they address and the material they discuss (Hunston & Thompson, 2001).

Hunston (1994) proposes that evaluation be viewed as having three aspects: status (discourse shows the writer's perception of the relation between that proposition and the world), value (assessment in terms of *good* or *bad*, which depends on the goals of the community within which the text has been produced), and relevance (the scale of evaluation is *important-unimportant* as shown by "relevance markers"). Evaluation is discourse pervasive, occurring cumulatively across large sections of text (Hunston, 1994). Along similar lines, and following principles from Corpus Linguistics, Hunston and Thompson (2001) present a collection of papers with a wide a range of approaches to the notion of evaluation and the relation among language, knowledge, and the world; in particular, the ways in which evaluative language expresses the value systems of individuals and communities.

Hyland and Diani (2009) present a compilation of works related to evaluative meanings in review genres such as *book reviews*, the *review article*, the *book review article* and the *review of literature* in PhD theses. In their words, "review genres are, in fact, crucial sites of engagement where writers argue their viewpoints, signal their allegiances and display their credibility" (p. 1). Along the same line, Hyland (1998) presents a thorough analysis of hedging in academic research papers and interviews, and connects these linguistic forms to a pragmatic explanation for their central use for scientific argument, and, ultimately, for the construction of science itself.

In relation to some specific evaluative features of language, there has been extensive work on the use of personal pronoun use in scientific writing in English and self-citation as linguistic realizations of the presence of the author (Harwood, 2005; Hyland, 2001; Kuo, 1999; Martínez, 2005; Tarone, Dwyer, Gilette, & Icke, 1998),

showing that pronouns *I* and *we* serve very important rhetorical functions in SRAs. Connected to first person singular pronoun, writers use self-reference to influence the readers' impression of themselves: they emphasize their participation as important, serious and established players in the field, they take an authorial stance and procedural choice, and they raise readers' attention to more published work available carried out by the same author.

There have also been numerous studies in connection with interpersonal meanings in Argentina. Ferrari (2009) has analysed the grammaticalisation of modal verbs, epistemic modality in SRA in the fields of Palaeontology and Medicine (2012), and the expression of modal verbs in SRAs (2013). Furthermore, Ferrari and Gallardo (2006) described evaluation in the introduction of Medicine research articles, and García Negroni (2008) has paid attention to how subjectivity is realised in the SRA written in Spanish.

Within the framework of SFL, a systematic framework of analysis of interpersonal meanings has been put forward. James Martin (2000a) and collaborators have developed the Appraisal System (Hood, 2004; 2005; 2010; 2012) with the purpose of offering a systematic framework for the study and understanding of interpersonal meanings. Because this system has an enormous potential of applicability in the comprehension of linguistic phenomena related to evaluation in discourse, Appraisal System is a linguistically-motivated analytical tool that I have decided to employ to study the language produced by students in order to achieve the aims of the present work: to determine whether the teaching of abstracts and SRA writing through the SSGP is effective, and to identify which linguistic elements students use in their writings from a Systemic Functional perspective, with a special focus on resources that construe interpersonal meanings.

2.5.3. The System of Appraisal

The System of Appraisal is located at the discourse semantics level (see Table 2.5 on page 32), and it is the system that describes the interpersonal and evaluative language that users resort to when expressing relations of power and solidarity, their subjective presence in texts, the stances they adopt towards both the content they present and those with whom they communicate (Martin & White, 2005). Appraisal realisations occur through a wide range of lexical and grammatical categories, which appear spread all over texts, in an interspersed manner, and which accumulate

discursively.

Origins of the System of Appraisal, as it is known nowadays, can be traced back to Halliday's seminal work on the grammar of mood and modality (1994) and to Martin's 1992 book *English text: System and Structure*. Research in this field has been extensively developed internationally by Martin and White (2005) and Martin (1997; 2000a) into a more lexically-based perspective, and further extended in a variety of genres, such as the descriptions of academic texts by Hood (2004; 2005; 2010), of the development of literacy enquirements at schools and the workplace by Iedema, Feez & White (1994), Iedema (1995), Martin (1997; 2001), and Rothery and Stenglin (2000), and of the media by White (2002; 2003; 2004) and Bednarek (2006; 2008; 2012), among many others.

The System of Appraisal is described by Martin and White (2005, p. 35) as follows (bolds as in the original):

The System of Appraisal is regionalised as three interacting domains – 'attitude', 'engagement' and 'graduation'. **Attitude** is concerned with our feelings, including emotional reactions, judgments of behaviour and evaluation of things. **Engagement** deals with sourcing attitudes and the play of voices around opinions in discourse. **Graduation** attends to grading phenomena whereby feelings are amplified and categories blurred.

The system, then, can be represented as shown in Graph 2.6.



Graph 2.6. An overview of Appraisal resources (Martin & White, 2005)

Appraisal System, which is organized around the semantics of evaluation and can become realised across an ample range of grammatical categories, is divided into three broad areas. Each of them entails more delicate meanings, also represented as semantic choices within a system. ATTITUDE¹, which involves the expression of positive and negative values, is divided into three regions (Martin & White, 2005, p. 35) (see Graph 2.7 below): 'Affect', which deals with resources for construing emotional reactions, 'Judgment' is concerned with resources for assessing behaviour according to various normative principles, and 'Appreciation', which looks at resources for construing the value of things, including natural phenomena and semiosis (product or process).



Graph 2.7. Delicacy in the system of ATTITUDE (Hood, 2010)

Appreciation is further developed into 'Reaction' (which refers to affection, whether things catch our attention or please us), 'Composition', which is further divided into Balance and Complexity (relates to perception, our view of order), and 'Valuation' (connected to cognition and our considered opinions).

The second system of Appraisal is ENGAGEMENT, which is concerned with the introduction and management of voices to whom values are attributed, or in other words, how position is taken through linguistic resources such as projection, modality, polarity, concession, and comment adverbials (p. 36). Finally, GRADUATION is concerned with gradability, i.e. the manipulation of degrees of values and the grading of meanings by adjusting the *force* of a value, or the *focus* of a categorical boundary (Hood, 2010).

2.4.3.1. Appraisal Studies on Scientific Discourse

When it comes to presenting research carried out in the field of Appraisal in academic writing, Susan Hood's (2004) comprehensive work needs to be mentioned. This author presents a possible solution to the apparent contradiction of the ways in which both 'objectivity' and critique are relevant in gaining control of written academic registers. She draws on SFL theory, and, in particular, on the theory of evaluation as Appraisal (Martin & White, 2005). She explains the process by which writers construct

¹ Following SFL notation conventions, system names are in Small Caps, while the second and following levels of delicacy are written with an initial capital letter.

evaluation towards knowledge and other specialists in the introductions of their SRAs.

Regionally, Appraisal studies in connection with academic and scientific genres have also been numerous. In Pascual's compilation (2014) *La Evaluación en el Discurso Científico: Aportes a la Comprensión del Diálogo de Pares*, several Argentinean researchers present their findings in connection with taking a critical stance to scientific genres dealing with experimental science discourse on areas such as Mathematics, Phonoaudiology, Economics and Linguistics. Other pieces of research include evaluative resources in SRAs in the disciplines of Physics and Chemistry (Pascual & Mirallas, 2015), the development of reading and writing strategies of scientific genres considering SFL (Unger, Waicekawsky, Lucero Arrúa, & Pascual, 2013), considerations of ATTITUDE and ENGAGEMENT in the Discussion section of SRAs (Lucero Arrúa, Unger, & Pascual, 2012), interpersonal resources in academic interviews (Pascual & Unger, 2009) and the way appraisal elements are employed in grant proposals written by Argentinean researchers (Pascual & Unger, 2010).

2.4.3.2. Appraisal studies on response and reaction texts

As stated before, interpersonal meaning analysis of response texts has not been as abundant as in the case of scientific genres. Nevertheless, a few can be mentioned.

Huffman (2015) investigated learners' experience with an automated writing evaluation software, which scores student's essays. The perception of users' interaction with this tool was presented in post-task open-ended survey responses. These were analyzed using the System of Appraisal, especially in terms of Attitude (Appreciation). She found that the software was useful, especially if issues in feedback accuracy were improved.

Ballard, Becker, and Smith (2017), working in Iowa University in the United States, carried out a study whose purpose was to analyse students' discourse of ePortfolio reflections, which were written after being assigned tasks related to website design. They found that Judgement was used more frequently (Capacity), especially when students evaluated their own skills and how these had developed throughout the activity proposed by the teacher, Affect (Security-insecurity) was the second most frequent, as students assessed how confident they felt in their learning process, and finally Appreciation (Social valuation) could be found, as students evaluated their creations and how suitable their websites were. Interestingly, the study involved native and non-native speakers of English, and the greatest difference in use between them was

that non-natives tended to use more resources of Affect in their reflections, especially when referring to their language abilities.

Within the context of Argentina, Martín, Helale and Faletti (2012) have used the System of Appraisal to analyse teacher trainees' class observations. Reports on class reflections were examined under the light of ATTITUDE (Judgement, Appreciation and Affect) and GRADUATION. They found that in this type of response-reflection texts, Valuation was the most frequent resource (effectiveness and usefulness) to assess the observed teachers' use of the blackboard, the instructions provided and the activities proposed in class. As to GRADUATION resources, language used to express Force (intensification) prevailed, particularly to intensify values related to teachers' instructions.

In this chapter, the theoretical frameworks that sustain this research have been presented: perspectives on Genre Theory, the techniques developed by the Sydney School Genre Pedagogy, current findings in relation to the abstract and the SRA, a description of the Systemic Functional Linguistics and the System of Appraisal. In the following chapter, the methodology that has guided the gathering of the data and the principles for analyses are presented.

Chapter 3. METHODOLOGY

In order to achieve the first aim of this study; i.e., to describe the language used in students' productions, this work combines qualitative and quantitative principles of analysis for the identification of evaluative language in terms of Appraisal. ATTITUDE and GRADUATION resources are analysed in students' abstracts. SRA introductions are described in terms of lexicogrammatical realisations and the rhetorical components students employed. In order to fulfil the second aim, which is to determine the effectiveness of teaching scientific writing through the SSGP, the language employed by students in response texts was analysed in terms of the Appraisal System. Through the collection of surveys, students' perceptions were gathered on the scientific writing course taught through the SSGP.

In order to gather student-produced scientific texts and data related to classroom practices, a course on scientific writing was taught at the Facultad de Ciencias Físico Matemáticas y Naturales at UNSL (approval of the course in Appendix 1, pages 1-10). It was aimed at intermediate and advanced students, teachers and researchers who needed to produce SRAs in English. The course was framed taking into consideration the principles of the SSGP, and it provided the students with linguistic resources that would enable them to produce appropriate abstracts and SRA introductions.

This section presents the methodology followed for the gathering of the data and the criteria of analyses. Chapter 3 is divided into two broad sections. The first one (3.1) describes the intervention during the teaching of the course and the considerations taken to apply the principles of the SSGP. The second segment (3.2) is devoted to presenting the collection and analyses of data that serve to the evaluation of students' written production and to the assessment of the effectiveness of the SSGP.

3.1. PEDAGOGICAL INTERVENTION

A course on scientific writing was taught on the basis of a weekly meeting from April 24th to August 1st, 2014. In the eight meetings that the course lasted, students were offered a variety of contents, ranging from contextualization of the production of scientific genres, to the practice and application of linguistic features which are typical of the different sections of the SRA (see Appendix 1, pages 3-11 for a complete description of the syllabus).

The teachers involved in the course were my colleagues MP, a teacher of English

(Universidad Nacional de Río Cuarto, UNRC onwards), Master in English (Applied Linguistics) (UNRC), Doctor in Linguistics (Universidad de Buenos Aires), and works at UNSL teaching ESP in the School of Chemistry; GLA, a translator of English (Universidad Nacional de Córdoba, UNC henceforth). She is currently finishing the postgraduate courses at UNC for her Master's degree in English (Linguistics) and works at UNSL teaching ESP at FCFMyN. LW is a translator of English (UNC) and holds a Master's degree in English, Applied Linguistics (UNRC); and I, a teacher of English (Universidad Nacional de Cuyo) and a specialist in higher education (Universidad Nacional de Cuyo).

The idea of teaching a course in scientific writing first came into being from the concern of the authorities of the FCFMyN, since many of the researchers in this school needed assistance with their scientific productions to be published internationally. At the beginning of this project, and without having a clear idea of the number of people who were interested in attending classes, the course was released for the whole university.

Quite unexpectedly, 114 people enrolled. Since this number was too large for the practical and personalised type of teaching that was intended, some criteria needed to be selected to reduce the number of students. The teachers decided that since it was FCFMyN the school which provided us with the opportunity to organize this course, so priority would be assigned to students, teachers and researchers working and studying in this school. In this way, potential attendants dropped to 50.

3.1.1. Contextualization

In this section, contextual aspects of the course, such as the students of the course, students' aims, interests, fields of research and expertise with English, are presented. The information included here was collected from an enrolment form that students had to fill in to take the course (see Appendix 1, page 11 for the enrolment form, and page 15-21 for participants' answers).

3.1.1.1. The participants of the course

At the moment that the course was offered, and since this was not a course on general English, some requirements were to be fulfilled by students willing to attend it, so that they would gain the most of the training sessions. Students needed to be participating in research activities, to have previous instruction in English, and to belong to the FCFMyN.

Initially, there were 28 students who began the course, although 4 people dropped after the first class. Out of the 24 people who finished the course, 19 were graduates and 5 undergraduates, and in terms of gender, 15 were females and 9 were males. In connection to their fields of study, there were two Electronics Engineers, one Chemical Engineer, two Geologists, 4 Physicists, and 15 students who held a graduate degree in Computer Sciences. In relation to the postgraduate education of the graduate students, 2 held Specialization degrees, 7 held Masters' degrees, and 7 held PhD degrees, while 5 of the students were working to obtain their postgraduate degrees.

All the participants had some type of relation with the UNSL: the undergraduate students were in the last stages of their studies (finishing their theses mainly), and two of them were also on a CONICET research grant. One of the graduate students was a full time researcher, 6 were *profesores adjuntos*, 6 were *jefes de trabajos prácticos* and 6 were teacher assistants. In the cases of the 18 teacher-researchers, 16 of them had a full-time job at UNSL and 2 had a part-time job (20 hours a week).

3.1.1.2. Participants' research expertise and areas of interest

The five broad areas research fields of the participants were Computer Studies (Creation of Virtual Environments, Natural Language Processing, Metaheuristics, Web Search Algorithms, Computational Geometry, Author Profiling, Plagiarism Detection, Data Mining and Databases), Physics (Computational Calculations of Chemical Reactions, Percolation, Statistical Mechanics, Monte Carlo simulations, Phases Transitions, Biological Systems Modelling), Geology (Sedimentology, Palaeontology, Taphonomy, Geomorphology, Quaternary Geology) and Engineering (Wireless Network Sensors, Microelectronics, Communication Protocols). All of the participants in the course were working in a research project: 3 were student researchers², 4 were researchers on a scholarship, 11 were teacher-researchers, 2 were co-directors in projects, 3 were directors of projects and 1 was an external collaborator.

3.1.1.3. Participants' English writing skills, experience and learning expectations

In the enrolment form, students were asked about their perceived level of English

 $^{^2}$ The categories used here for the different researcher roles are the ones used by the *Secretaría de Ciencia y Técnica*, UNSL.

in relation to the four skills: reading, writing, speaking and listening. The majority of the participants reported that they had elementary (10) or intermediate (11) writing skills from the scale *beginner*, *elementary*, *intermediate*, *upper intermediate and advanced*. This information needs to be considered cautiously, as it represents participant's view on their performance in English, and not as their actual skills as measured by a standardised test.

	Reading	Writing	Speaking	Listening	Total
Beginner	0	1	4	3	8
Elementary	3	10	10	12	35
Intermediate	13	11	11	7	42
Upper Intermediate	8	4	2	4	18
Advanced	4	2	1	2	9
Total	28	28	28	28	

Table 3.1. Students' perceived level of their English skills

When students were asked on their reading skills, 23 of 24 mentioned that they read papers in their discipline without any problems, 10 mentioned that they had some type of lexicogrammatical difficulties. When asked about their experience in writing for publication, 15 participants mentioned having published in English, while 9 had not done so before. In connection with the type of writings they had done, they mentioned complete SRAs or segments of this genre, abstracts for congresses and other presentations, extended abstracts, popular science articles, articles for congresses, and reports.

Although the writing course had objectives of its own, students who attend the type of course we taught usually come with their own expectations. Among others, they mentioned that they needed to learn to improve their writing skills and gain fluency, to write and publish their investigations in English; to gain autonomy; to improve linguistic use of grammar and lexis; to learn more about the Genre (SRA), and about the process of publication.

3.1.1.4. Materials for the course

The materials for the course (Appendix 3, pages 1 to 97) consisted of power point slides adapted from previous instances of the teaching of this course. Parts of the material were adjusted to incorporate the teaching sequence described by the SSGP. In addition, a set of worksheets were specifically designed for the teaching of the course (pages 98 to 134). Finally, the guidelines for the final evaluation of the course are also

presented in Appendix 3 (page 135).

Since the course was taught by a group of teachers working at the *Área 10 Lenguas Extranjeras* (Departamento de Educación y Formación Docente, Facultad de Ciencias Humanas), the material was collaboratively created and adjusted. However, since my interest was collecting data related to students' perception on the writing methodology proposed by the SSGP, I designed and carried out specific activities related to the writing of the Title, Introduction and Methods of the SRA, following the techniques described in the SSGP teaching cycle.

3.1.2. The course: objectives, contents and methodology

The objectives of the course were to enable students to: a. generate clear and effective scientific SRAs adequate for an international community; b. identify typical genres of scientific activity; c. become familiar with the abstract and SRA generic structure; d. develop generic awareness; e. become acquainted with typical and highly frequent lexicogrammatical realisations for sections of the SRA; and f. be able to take a stance in their texts so as to position themselves within the scientific community.

The linguistic contents of the course were organised around the genre that students intended to produce (the SRA), and around the contextual elements that have an impact on the lexicogrammatical choices that users of the language make. In Table 3.2, a summary of the contents and the objectives for each class are presented. In Appendix 2 *Teacher Journals* (pages 4 to 45), a more exhaustive description is presented of every class, including not only the activities developed, but also appreciations of my own when I considered them worth being mentioned.

Class	Main teacher/s	Contents taught	Objectives of each meeting
1	MP	Introduction to scientific language. Research as a social practice. The research cycle. Genre notions. Public and occluded scientific genres in the scientific activity. Elements that have an impact on academic and scientific activity.	 By the end of the class, students will: get to know each other; get acquainted with the methodology of the class; share some basic knowledge on academic and scientific language (context of production).
2	MP	The SRA title. Keywords. Dense	- recognize the components of
	СМ	nominalizations. Examples and analysis of titles in students' own corpus. Search of material online. The abstract as a genre. Definitions. Social purpose. Functions. Types of	nominalizations as distinct grammatical constituents in titles of scientific writing; - identify the abstract as a scientific genre, and become

Table 3.2. Summary of contents and objectives of the course

Class	Main teacher/s	Contents taught	Objectives of each meeting
		abstracts. Constitutive sections: obligatory and non-obligatory. Lexicogrammatical realizations. Reading and identification of constituents. Characteristics of an effective abstract.	 familiar with two different types of abstracts; get to know the obligatory and non-obligatory constituents of the abstract; determine the tenses typical of the different segments of the abstract.
3	СМ	Joint construction of a title. The report of activities and methodology: the Methods sections. Frequent lexicogrammatical realizations. Analysis and production of examples. Analysis of frequent errors. Solving doubts and problems. Suggestions for an effective writing from the analysis of sample texts, edition, writing and re-writing of texts. Impersonality.	 write a title, together with the teacher and classmates, by taking as a basis a sample title from an SRA; be introduced into the Methods section; describe the typical lexicogrammatical elements used in the Methods section to express impersonality.
4	CM MP	The Research Article. Constituents. Relevance and typical realizations. How to write research objectives: typical verbs used. Some notes on punctuation. Verb forms to define objectives and report action. Suggestions of frequently occurring realizations. The Methods section. Characteristics. Functions. Frequent lexicogrammatical realisations. Passive Voice. First and third person. Analysis of samples. Joint writing of a Methods section.	 identify the different sections that make up an SRA and describe the importance of this genre in the scientific community; use verbs to describe objectives of their research with lexical items that express epistemic activity; write general and specific research objectives in English; Write a Methods section jointly with teacher and classmates.
5	СМ	The Introduction. Functions. Constituents. Resources to state the relevance of a piece of work. State of the art. The typical constituents of the Introduction. The CARS model. Establishing a territory. Establishing a niche. Occupying the niche. Analysis, edition and joint writing of the Introduction section.	 describe the function of an Introduction in the SRA; learn the different rhetorical possibilities for an Introduction to establish and occupy the niche; enlarge their lexicogrammatical repertoire in relation to language frequently used in the Introduction section to establish and occupy the niche.
6	GLA CM	The Results section. Characteristics. Functions. Typical syntactic and lexical forms. Analysis of participants' own samples of Results sections. Suggestions for efficient and effective writing from the analysis of sample models. Edition of participants' writings and joint writing of the Results section.	 Identify the function of the Results section; Distinguish the purposes of the different rhetorical sections in the Results section; Get acquainted and practise with frequent lexicogrammatical realisations in the Results section of an SRA.

Class	Main teacher/s	Contents taught	Objectives of each meeting
		Production of a Results section.	
7	LW	The Discussion section. Characteristics. Functions. The interpersonal meanings. Linguistic resources for the construction of positions, viewpoints, allegiances. Modality in the science. Probability and evidentiality. Resources for mitigation and reinforcement. Modal verbs. Epistemic verbs of judgment and evidentiality.	 identify the function and the different rhetorical sections of the Discussion section; get acquainted and practise with typical lexicogrammatical realisations in the Discussion section of an SRA, particularly with tentative language and other interpersonal resources.
8	LW CM MP	Use of reference tools for effective writing: bilingual and monolingual dictionaries, collocations and thesaurus dictionaries; corpus analysis, concordance software, colligations. Intertextuality. Dialogue with peers. Direct and Indirect discourse. Different forms to quote and cite. Conventions. Verbs used when citing. Meanings in different uses. The Conclusion and the Acknowledgements.	 Get acquainted with the use and value of linguistic analysis tools such as concordance softwares; Distinguish different dictionaries and the purposes they serve; Identify different citing strategies and the rhetorical purposes they have; Discuss the purpose of the sections Conclusions and Acknowledgements in an SRA.

In connection to the general methodology of the course, teachers guided the presentations with slides which had been previously prepared (see Appendix 3, pages 1-97). Student participation was constantly requested, and students were willing to answer by providing their knowledge about both their discipline and the linguistic conventions in the SRAs of their fields.

It is worth mentioning that in the first class, students were asked to compose a corpus of 10 SRAs that would be used as reference for practice. Articles needed to be connected with their areas of interest, and they also served the lexicogrammatical purpose for which they were gathered, which was to represent a linguistic reference. In this sense, authorship of the articles required special attention, for it was advisable for students to select texts written by authors with an academic affiliation to an English-speaking institution. In the following classes, this corpus would serve as material for observation and for analysis.

3.1.3. SSGP sequence in the course

Since the teaching sequence of the SSGP is quite time-consuming and pays special attention to students' comprehension of sample texts, and to text production, this approach was carried out in the teaching of only some sections of the course: the Title, the Introduction, the Methods and the Results sections.

Although the teaching sequence presented by the SSGP involves the reading of a text before writing, the development of the reading skill was not fully practiced for two main reasons. The first one was that since the students participating in the course were all proficient readers of scientific texts in English, there was no real need to invest the already short available time practicing this. Second, the focus of this study was to determine the effectiveness of the SSGP in the teaching of writing, and not on reading.

In the following section, a brief summary of the classes that focused on teaching writing through the SSGP (Title, Introduction) is presented. For a detailed description of the activities and procedures of each class, see Appendix 2 (pages 4 to 45).

3.1.4. The teaching of the SRA through the SSGP

Although four sections of the SRA were taught following the procedures described by the SSGP, only procedures followed for teaching the Title and the Introduction are detailed here, since these are the sections that were analysed linguistically in this work.

3.1.4.1. Writing a Title through the SSGP

In the second class of the course, we dealt with the writing of Titles. For the *Preparation for writing* stage of the SSGP, the importance of a good title was discussed with students, along with the type of content they needed to include, depending on the disciplines at stake. As to the *Detailed reading* stage, students' attention was drawn to the type of grammar used in titles of their disciplines: nominalisation, compound nominalisations (usually separated from each other with a colon) or sentences. Students identified different structures for real titles in a worksheet and shared their findings with the rest of the class.

The following class (third class) involved the *Joint writing* of a title. Students were informed about the purpose of including this activity: to implement the SSGP in order to assess it. Since they were professionals in the field of research, they seemed very interested in the direct and completely overt explanation of the SSGP procedure as part of the methodology of my study. We started by taking a sample title from the paper we had looked at in classes before: *Downward migration of radiocaesium in organic soils across a transect in Scotland*. We analysed the type of construction it had. First, I

copied the title on the board and then together with the students, identified its grammatical constituents. In the *Preparation for writing* stage, students discussed the type of information included in this title in particular, and different disciplines in general. We also built previous knowledge on the topic of the sample title (how radioactive materials are spread over different soils, and how they affect human life).

In the second phase of the SSGP –*Joint Construction*– I guided students to jointly write a new title from the points discussed when analysing the sample model. Because of the variety of fields of study of the students in the course, we decided to work on one piece of research lead by a Physics teacher, who explained to everybody what his investigation was about. As students thought of different ideas, we started writing the title on the board, with options as they came up, without discarding any of the ideas students provided, and encouraging every answer.

We followed the grammatical pattern identified in the Physics field (two nominalisations separated by a colon) and the experiential meanings usually expressed in Physics titles: object of study, method and/or theoretical framework used. Since the *Joint Construction* and *Joint Re-Writing* levels are intrinsically related, both happened almost simultaneously as the production of the title was constantly edited and re-written as ideas came up. In this way, students were guided to successfully write a title borrowing the same sophisticated language patterns from real SRAs.

The third phase *-Individual Construction*- was intended for students to work on their own as homework, after they had been guided and accompanied by the teachers in the course. Students were asked to write a title of their own, or to revise the title of the SRA they had already written to improve it, considering what was presented in class. In the *Individual Re-Writing*, students revised their title and checked them against the new observations they made during the class taking into account the patterns that emerged in their disciplines.

3.1.4.2. Writing an Introduction through the SSGP

In the 5th class, the CARs (Swales, 1990) model for writing Introductions was presented. As part of the *Preparation for writing* stage, students discussed the importance of Introductions, the type of information they included and what its rhetorical purpose is. Then, I referred to the three main moves that have been identified in the literature available (establishing a territory, establishing a niche and occupying the niche) (Swales, 1990), and mentioned the steps that can be found in every move. In

order to carry out the *Detailed reading* stage, the class proceeded with the following methodology. First, the rhetorical purpose of each move and step was explained. Then an example of the move/step was presented and read aloud by the teacher. Thus, instead of the selection of one segment of text, as suggested by the SSGP (Rose & Martin, 2012), several sections of different Introductions were chosen, so as to exemplify the move/step under analysis. As students followed the teachers' reading, they had to look for the words/phrases that pointed out the rhetorical move/step under analysis. Students highlighted these phrases in the copies they were given.

In addition to the examples of moves from the SRAs, students also read a repertoire of phrases that they might use when writing an Introduction. In the case of the language used to establish a niche –when there is usually a lack of knowledge, a void that needs to be filled– negative language is very helpful to express that there is some knowledge missing. Students were provided with a list of phrases, such as verbs like "X failed to consider", adjectives like "incomplete", and openings like "However, little information on...". Students acknowledged having seen most of the phrases before, but they thought it was really useful to have all these expressions together in a list. This activity completed the *Detailed reading*, as they were provided with elaborate linguistic patterns they might use in their SRAs.

After this reading practice, writing became the focus of attention. Since the participants in the course belonged to different disciplines, it would be difficult to write an Introduction for each area of knowledge. Thus, we thought of something that we could all contribute to: we would state the need to synchronize traffic lights in the city of San Luis, and the lack of efforts to solve this problem so far.

On the last page of students' Worksheet #3 (Appendix 3, page 112), students found a skeleton of an Introduction, with phrases which are typically found in an SRA. For the *Joint writing* activities, work was very collaborative, as students who had a better command of English tried to contribute with the words for the ideas that other classmates could only frame in Spanish. As ideas came up, one of my colleagues helped with the typing of the Introduction into the skeleton, as I guided and organised students' comments.

When students seemed to run out of ideas on what to say next, I asked questions for them to move on. For the *Joint rewriting*, teachers and students re-read the production and improved some wordings, added connectors and resorted to some of the linguistic repertoire they had been provided earlier to include some phrases. The final production of this activity is presented in Appendix 3, on page 113.

For the *Individual construction stage*, students were asked to produce an Introduction section of their own. Since not all students had the same expertise in their command of English, this was not compulsory to be handed in.

3.1.5. Conditionings and special situations when teaching the course

As the course developed, a series of strikes took place, organised by the main labour unions representing university teachers, which affected the normal frequency of the classes. Therefore, the course took longer than the two months expected. In addition, the course was originally planned to be developed in meetings of three hours each, but due to the lack of classroom availability, and the busy schedules of graduate classes, a classroom for only 2 hours was booked on Friday mornings.

3.2. COLLECTION OF DATA AND CRITERIA FOR ANALYSES

This section presents the methodology that guided the collection of a variety of texts and the criteria employed to analyse the corpora. As regards confidentiality and privacy issues, participants of the study were informed in detail about the aims of the investigation and the purpose for which the data was to be used. Students were also informed of the tasks they were expected to perform. They were told about the possible benefits of pursuing the writing course, and that the results of my research would be reported with no reference to their names so as to ensure confidentiality. They were free to leave the study at any point, and once the study was complete, they would receive a feedback report on what was found. Participants were asked to fill in an agreement form like the one displayed in Appendix 1 (page 22).

In order to attain the objectives of this research work, i.e. to assess the effectiveness of SSGP and to describe the language in students' productions, two main corpora of texts were gathered, one composed of scientific productions, and the other of reaction texts (Graph 3.1).



Graph 3.1. Corpus composition

Students' production of scientific discourse constitutes Corpus 1, which involves abstracts written *before* and *after* the course (labelled Corpora 1A and 1B respectively), and SRA sections (Corpus 1C). On the other hand, student responses (Corpus 2) entail class-surveys (Corpus 2A), end-of-course surveys (Corpus 2B). Additionally, this research considers my own journals on what happened in the course (Corpus 2C) for triangulation purposes. These are summarised in Table 3.3.

 Table 3.3. Corpus composition summary

Corpus	Subcorpus
	A. Abstracts - versions before the course
1. Students' scientific discourse	B. Abstracts - versions <i>after</i> the course
	C. SRA sections
2 Student and tasshar	A. Students' responses to class-surveys
2. Student and teacher $percentions^3$	B. Student's responses to end-of-course surveys
perceptions	C. Teacher journals

Since the data gathered deals with information from various sources, the methods of collection, criteria for selection and principles of analysis are specific for each. Section 3.2.1 presents the methodology for Corpus 1, while section 3.2.2 expands on the criteria for Corpus 2. Finally, section 3.2.3 describes the potential uses of the UAM CorpusTool, a software that was used to analyse and tag texts.

3.2.1. Corpus 1: Students' scientific discourse

The analysis of students' productions directly contributes to the description of the language employed in their texts. This section presents the methodology that guided the collection of a variety of texts written by the students, as well as the criteria for analysis

³ Bitchner and Basturmen (2006) describe students' perceptions on writing. Although they focus on interviews, they mention surveys as one of the possible sources of information for describing students' perceptions.

of abstract versions *before* the course (3.2.1.1) *after* the course (3.2.1.2), and for SRA sections (3.2.1.3).

3.2.1.1. Corpus 1A: Abstracts - versions before the course

Two different sets of abstracts were collected in order to compare ATTITUDE and GRADUATION elements, and rhetorical components between them. Although the aim of this work is not intrinsically contrastive but descriptive, a comparative methodology is followed to throw light onto aspects that a description of students' final productions on its own would not display.

Participants were asked to provide an abstract they had written *before* the course, which had been presented for scientific activities such as in the production of an SRA or at a conference. The criteria to include abstracts in this collection were that they needed to have been produced up to six months before the course began, and that texts had to be written by participants themselves. A total of 11 abstracts were collected, and are presented in Appendix 5 (pages 1-7). Since bringing an abstract prior to the course was not a compulsory requirement for participants, not all of the students contributed to this corpus. Some of them simply did not bring one, although they already had some experience in writing, and some of them had never written an abstract before, and they simply did not have one.

Although it might be problematic to determine whether students actually wrote the abstracts *before* the course, and did not simply bring someone else's text, there might be a few reasons why they collaborations were not excluded from this study. Students were asked to contribute with my study by providing their texts, and this was not a requirement for them to attend the course, so under no circumstance were they obliged to bring a text. Additionally, abstracts were so specific to each of their fields of study that it would have been difficult for someone else to write these texts. Finally, a second version of abstracts (*after*) written during the course verifies (to some extent) the authorship of the first one.

This corpus was analysed using the UAM CorpusTool in terms of its components (IMRD) and Appraising elements (analysis is presented in the attached CD). First, rhetorical sections in the abstract were identified and tagged in the corpus considering the sections *Title, Introduction and/or Theoretical Framework, Objective, Method, Results, Discussion, Conclusions and/or Applications for future research,* and *Keywords.* These were arranged in a system, as shown in Appendix 6, page 2. The

tagging was double checked with three other colleagues who collaborated with the teaching of the course. Counting rhetorical components involved either their presence or absence in the abstract.

As to the analysis of interpersonal meanings, this was carried out on the basis of the System of Appraisal. The system employed has been adapted from Martin and White (2005) (see Appendix 6, page 3), and the criteria for the analysis includes the following:

- a. Entities are semiotic objects that are appraised by the writer. These elements may be real or they may be abstractions or mental constructions of the writer. In the case of [1], "metric space approach" is the entity⁴, and it is appraised by "promising", which entails a positive characteristic of the approach. At the same time, this quality involves a concession. Even when there might be positive characteristics to the approach, it is, nonetheless, "immature".
 - [1] [Corpus 1B. Student 22] Although **promising**, the *metric space approach* is still **immature** in several aspects that are **well established** in *traditional databases*.

A different entity, "traditional databases", is evaluated positively through "well established", and this entity is presented like a more suitable option than the "metric space approach".

- b. The language of students' scientific discourse was analysed taking into consideration the context in which it functions, i.e. in a scientific context and within a specific discipline. Although some wordings in the texts may seem to be evaluative for everyday discourse, such language was not analysed as evaluative in cases when fields of study have devised a specific set of technical terms. For example, in everyday language, the words "solve" and "problem" have a positive and negative connotation, respectively. However, in the analysis presented here, these terms have been considered in the context of science, and more precisely, taking into consideration that both "solve" and "problem" are terms used to nominate the object of study.
 - [2] [Corpus 1A. Student 3.] The proposed approach is used to **solve** Economic Dispatch **Problems** (called IA EDP, for Immune Algorithm Economic Dispatch Problem).

In the case of the example [2], within the field of Computer Studies, there exist

⁴ For the sake of notation, entities have been identified in italics while appraising language is in bolds.

"problems" that need "solutions". Nevertheless, these have become devoid of evaluative meanings as they are experiential in nature and represent components of the object of study.

- c. In the case of compound nouns which are proper of the discipline, and which depend on the field of study, they were discussed with authors to determine whether there is a subjective evaluation expressed in the lexis. In words such as "childlike" and "warlike", there is an evident subjective evaluation within the system of GRADUATION, particularly, of the prototypicality and category preciseness by which the boundary of the entity is softened (Focus: Valeur: Specificity: Soften focus).
 - [3] [Corpus 1B. Student 1.] This paper introduces the development of a Conversational Character as a question-answering assistant for task-generic applications into a **Cave-like** environment.

In the case of [3], "Cave-like" is not an evaluative term within the field of Computational Studies and Virtual Environments, but rather the name given to a specific type of virtual environment. In these cases, the lexis was not considered to be evaluative.

- d. Lexical elements such as "significant", "negligible", "different" and "dependent" were not considered to be evaluative when they express the statistical relationship between and among variables. In the case of [4]:
 - [4] [Corpus 1A. Student 22.] The outcome is a fully dynamic data structure that can be managed through insertions and deletions over arbitrarily long periods of time without any **significant** reorganization.

the percentages and degrees to which the reorganization is defined depends on each of the disciplines, and this is not something a linguistics analyst can identify as evaluative.

The quantification of lexicogrammatical realisations expressing ATTITUDE and GRADUATION has been expressed per 1000 words in order to determine the real Evaluative Density of these elements (ED henceforth). This is the result of the division of the number of appraising instances by the number of words in the corpus (Shiro, 2003):

$ED = \frac{number \ of \ appraising \ instances \times \ number \ of \ words}{1000}$

In this equation, the *number of evaluative instances* corresponds to the total of appraising elements in the corpus under analysis; the *number of words* is the total

number of words in the corpus; and the number 1000 is the normalisation value that makes comparison between texts possible.

This section has presented the criteria for selection of the abstracts produced *before* the course (Corpus 1A). The following section presents the methodology for abstracts *after* the course (Corpus 1B).

3.2.1.2. Corpus 1B: Abstracts - versions after the course

This corpus is composed by the texts that students produced as part of the final evaluation of the course (see Appendix 5, pages 8-19), after the course had finished. Students either wrote a completely new abstract or improved a version of an abstract they had previously written for their academic activities (see guidelines in Appendix 3, page 135). Students reviewed the concepts studied in the course (contextual elements that have an impact on the written production and linguistic realisations). Although 15 samples were collected, only those matching the versions *before* the course were taken into consideration for the presentation of results; i.e. abstracts under analysis include only those written by the same student *before* and *after* the training.

Abstracts produced *after* the course were analysed both in terms of their rhetorical components and Appraisal elements in the same manner as the ones written *before* the course (see 3.2.1.1 above). This criterion ensures the possibility for comparison between corpora.

3.2.1.3. Corpus 1C: SRA sections

From all SRA sections taught in the writing course, Titles and Introductions have been selected for the sake of analysis, since these were taught closely following the methodology presented by the SSGP. Corpus 1C is constituted by 19 Titles and 10 Introductions. Since there are no *before* and *after* versions of the SRA sections to make a comparative study in the way that abstracts were examined, Titles and Introductions were described in the light of the contents taught for each section. In the case of Titles, the grammatical form (nominalizations or sentences) and the semantics expressed were considered; that is, whether Titles included the field of study, the methodology or the location of the research, among other experiential meanings. As for Introductions, rhetorical moves (Swales, 1990) and frequent lexicogrammatical of this section (verb tenses, negative language, deictics) were identified. Table 3.4 summarises the elements in focus considered for the two SRA sections.

SRA section	Features analysed		
Titles	Form: most frequently used structure in students' disciplines: [nominalization] (with pre and post modifications); [nominalization: nominalization]; [sentence] (see slides in Appendix 3, pages 1-97). Semantics: most frequent meanings expressed in students' disciplines.		
Introduction	 Rhetorical: - Move 1: Establishing a territory (Step 1 Claiming centrality and/or Step 2 Making topic generalizations and/or Step 3 Reviewing items of previous research); Move 2: Establishing a niche (Step 1a Counter-claiming or Step 1b Indicating a gap or Step 1c Question-raising or Step 1d Continuing a tradition); Move 3: Occupying the niche (Step 1a Outlining purposes or Step 1b Announcing present research, Step 2 Announcing principal findings, Step 3 Indicating Research article structure) (see 2 3 2 on page 28) 		
	Lexicogrammatical: Verb tenses (Present Perfect, Simple Past, Simple Present); Quotations (integral, non-integral); "Negative" verbs & adjectives; phrases to claim centrality ("has received much attention"); deictics and references to current research ("this paper").		

 Table 3.4. Features analysed in SRA sections

In the case of Titles, students were asked to analyse these in the SRAs of the corpus they had gathered, and to determine the form that they displayed ([Nominalisation], [Nominalisation: Nominalisation] or [Sentence]). They also determined the semantics expressed; that is, if the title usually presented the methodology, the results, techniques, or any other piece of information apart from the object of study. What is analysed for Titles is the extent to which students followed the recurrent pattern typically used in their own disciplines.

Regarding the Introduction, two features were described. First, rhetorical moves were classified (see 2.3.2 on page 28) to determine the extent to which students used these components in their writings. Second, frequent linguistic features presented in class –particularly verb tenses and language to establish the territory and niche, and to occupy the niche– were identified to decide whether students could use them appropriately in their writings.

In section 3.2.1 above, the procedures for the collection and study of students' scientific discourse are described. In the following section, the methodology for the gathering of the students' responses and teacher's perceptions is presented, along with the ways in which each set of data was analysed.

3.2.2. Corpus 2: Student and teacher reactions

Three sets of data that contribute to the evaluation of the effectiveness of the SSGP have been selected. First, a corpus was composed by students' responses to a class-survey collected at the end of every meeting of the course (see 3.2.2.1 below). Second, an end-of-course survey was filled in by students as part of the requirements of the final evaluation of the course (section 3.2.2.2). It is important to mention that both surveys have been filled in Spanish. A third element that contributes to the triangulation of data and adds the teacher's perceptions is the teacher's journals (section 3.2.2.3).

3.2.2.1. Corpus 2A: Students' responses to class-surveys

After every class, students were given paper forms to be filled in asking them about the objectives of the class, the activities they found useful, the difficulties they came across, and what they thought were the best and poorest aspects of the class. Questions asked students about suggestions for the course and aspects to be improved, about contents on which they would like to have more material, and any other comments. Surveys for classes are presented in Appendix 4, pages 1-4. These surveys were completed in Spanish since students participating in the course are not used to writing response texts in English. Because they may not have had the necessary lexicogrammatical resources to produce the opinion type of text required, Spanish was preferred.

A total of 151 surveys was collected, with a distribution along classes as follows (Table 3.5):

Table 3.5. Class-surveys collected

Class #	Surveys
1	27
2	20
3	18
4	15
5	19
6	16
7	20
8	16
Total	151

The surveys were digitalised and analysed manually. The annotations were carried out in the UAM CorpusTool. All lexicogrammatical elements expressing ATTITUDE were identified and subclassified according to subsystems (Affect, Judgment, Appreciation) and according to their polarity (positive or negative). Additionally, world entities to which the appraising elements referred were identified. For example, in the case of the question "¿Qué actividad puede mejorarse?" (What activity can be improved?), "actividad" (activity) is the entity, or semiotic object in the real world that is appraised by "puede mejorarse" (can be improved). Once identified, entities were classified according to emerging categories and a system of analysis was devised (see Appendix 6, page 6). In this way, an association was made between the components in the course students identified and their positive or negative evaluation.

There were two main types of questions in the surveys: those which did not contain an appraising element and those which did. The first ones include questions like "Please, provide any other comment that was not considered in this sheet". In these cases, both entity and appraising element were present in students' answers, and were tagged in the software. In [5], the appraising elements are "muy buena" (very good) and "interesante" (interesting), and the entity evaluated is "la clase" (the class).

[5] [Corpus 2A. Student 19. Question 8. Class 1.] Me pareció **muy buena** e **interesante** *la clase*.

However, in the case of the second type of question which included an appraising element, such as in "What activities were **useful**?" (example [6]), the appraising element was sometimes absent in students' discourse because it had been already triggered in the question. Therefore, the evaluative element was supplied and tagged accordingly. In example [7], only the entity is present in the answer.

- [6] Question: Revise las tareas llevadas a cabo durante esta clase. ¿Qué actividad/es le resultó/resultaron **útil/es**? ¿Por qué?
- [7] [Corpus 2A. Student 7. Question 2. Class 1.] En general las diferentes *discusiones* que se dieron durante la clase.

The appraising element tagged for the entity "discussiones" (discussions) was the one which corresponds to "útil/es" (useful) [ATTITUDE: Appreciation: Valuation].

3.2.2.2. Corpus 2B: Students' responses to end-of-course surveys

At the end of the course, students were asked to fill in an online form as part of the requirements of their final evaluation (see Appendix 4, pages 66-73, available in https://docs.google.com/forms/d/19y_EnszJX7gqWHPmQWOwiiWOjyWWHqLMBfC F9Fs4Qyo/viewform). In this form, a universe of 14 students assessed aspects of the course, such as the organization and length of the meetings, methodology of the teaching, linguistic and rhetorical contents, and the evaluation. The answers to this
survey were collected automatically in a spreadsheet (Appendix 4, pages 74-87). In keeping with the same criteria in connection to the language used for class surveys, endof-course surveys were also completed in Spanish so that students had the chance to express their views in detail without the constraint of using English as a foreign language.

Questions included in this survey have been classified into two main types (Table 3.6), depending on the type of answer they initiate: discourse or an option in a multiple choice set. Question 1 has not been included because it asked students' names.
Table 3.6. Question types in the end-of-course survey

	·
Туре А	2 - 3 - 4 - 5 - 13 - 16 - 17 - 18 - 24 - 26 - 27 - 28 - 29 - 30 - 31
Type B	6 - 7 - 8 - 9 - 10 - 11 - 12 - 14 - 15 - 19 - 20 - 21 - 22 - 23 - 25

Type A questions triggered students' discourse, and the answers were analysed following the methodology described for class-surveys (section 3.2.2.1 above). Type B questions asked students to provide an appraising element ranked in terms of GRADUATION as an answer. These questions followed the pattern of "Determine the degree to which your objectives for the course have been achieved" with a series of answers: They have been <u>completely/largely/partially/scarcely</u> fulfilled / They have not been fulfilled. The purpose of these questions was to assess different aspects of the course systematically and triangulate the results in Type A questions.

3.2.2.3. Corpus 2C: Teacher journals

Although classes were conducted in Spanish, journals were written in English. Writing journals was carried out the day after the meetings of the course, in order to keep the time between the teaching and the reflections to a minimum. The main guide that followed my writing was a chronological order. I also included my own thoughts regarding the exercises, and introduced students' comments when they were relevant to the assessment of the tasks of the course. These journals are presented in Appendix 2 (pages 4 to 45). Since the objective of keeping teaching journals was the triangulation of results in Chapters 4 and 5, no qualitative or quantitative discourse analysis of the journals has been carried out since this description would fall beyond the scope of the objectives of this research.

3.2.3. UAM CorpusTool

A last and brief section in this chapter presents the UAM CorpusTool, developed

by Michael O'Donnell (2008) at Universidad Autónoma de Madrid. This is a free downloadable software (http://www.corpustool.com) for the manual or automatic annotation of segments or whole texts of a corpus. It allows users to tag multiple texts using annotation schemes, to design the systems of these schemes according to the researcher's interests, and to load more than one corpus, enabling the possibility to compare and contrast them.

At the same time, different levels of annotation can be carried out. For example, it is possible to annotate rhetorical components like "statement of purpose" in an abstract, and then carry out an Appraisal analysis on the same abstract and annotate realisations like "useful" in the a previously identified section "statement of purpose". In this way, other layers enable users to tag elements at the lexicogrammatical level, such as appraising words or phrases that contribute to an overall discursive negotiation. UAM CorpusTool allows users to cross different sets of data, and even to compare a specific tagged feature in different corpora.

One drawback of this tool is that users cannot export tagged texts, and the visualisation of this information is only available with the software. For this reason, the analyses are only available in the CD that accompanies this work (for set up see Appendix 6, page 1).

3.3. METHODOLOGY: SUMMARY

For the sake of clarity, here we present an abridged panorama of the methodology. The corpora gathered in this research work are summarised in Table 3.7:

Corpus	Texts	Samples
	A. Abstracts <i>before</i> the course	11
1. Students' scientific	Corpus Texts S Students' scientific discourse A. Abstracts before the course B. Abstracts after the course C. SRA sections Titles Introductions A. Class-surveys* B. End-of-course surveys* C. Teacher Journal	11
discourse	C SPA soctions Titles	19
	L. SKA sections Introduction	ns 10
2 Stadart and	A. Class-surveys*	151
2. Student and Tasahan Danaantiana	B. End-of-course surveys*	14
Teacher Perceptions	C. Teacher Journal	8
	Tot	al 224

 Table 3.7. Summary of the corpora collected

*Surveys were conducted in Spanish

The methodology to analyse the data aims to achieve the main purposes of this work. By looking at the abstracts produced by the students *before* and *after* the intervention (Corpora 1A and 1B) and at the SRA sections they wrote (Corpus 1C), a comprehensive analysis of students' written production is attained. At the same time, the

second objective, that is, the assessment of the effectiveness of the genre pedagogy, is achieved by taking into consideration students' answers in the class-surveys (Corpus 2A), end-of-the-class-surveys (Corpus 2B), and my own journals (Corpus 2C). Graph 3.2 below presents how the different data sources contribute to the two main aims of the study.



Graph 3.2. Summary research objectives and data sources

This chapter presented the methodology that has been followed for the teaching of the course, the collection of different sets of data, and the criteria for the analyses carried out. Chapter 4 deals with results and discussion on student's scientific discourse (Corpus 1), while Chapter 5 displays students' and teacher's perception texts (Corpus 2).

Chapter 4. RESULTS AND DISCUSSION ON CORPUS 1: STUDENTS' SCIENTIFIC DISCOURSE

Chapter 4 presents the results and discussion of the analysis of students' scientific discourse; i.e. abstracts and SRA sections. It is divided into two sections. The first one (4.1) explores the outcomes related to Corpora 1A and 1B; i.e. abstracts *before* and *after* the course. The second section (4.2) presents Corpus 1C; i.e. SRA sections (Titles and Introductions). This chapter contributes to one of the two main objectives of this work, which is to describe and compare lexicogrammatical and rhetorical elements in students' abstracts *before* and *after* the course, and to establish whether their SRAs display elements presented in the course.

4.1. CORPORA 1A AND 1B: ABSTRACTS BEFORE AND AFTER THE COURSE

The results presented here take into consideration two matching corpora of abstracts produced *before* and *after* the course, written by the same participants. This description involves an Appraisal analysis, with a focus on the subsystems of ATTITUDE and GRADUATION, and the comparison of rhetorical components in students' abstracts. Since the two corpora have different amounts of language, results are normalised per thousand words (see 3.2.1.1 above) to compare the data.

4.1.1. ATTITUDE

Corpus 1A is made up of 2531 words, which is smaller than Corpus 1B, containing 3594 words. The use of ATTITUDE resources is higher in all three subsystems in Corpus 1B, with Appreciation displaying the highest increase. Table 4.1 shows the number of instances per ATTITUDE subsystem, the normalisation per thousand words, and the difference in normalization between Corpora 1A and 1B. It also displays ATTITUDE subsystems of Affect, Judgment and Appreciation.

System		Feature	Corp Abs <i>be</i>	Corpus 1A Abstracts <i>before</i>		Corpus 1B Abstracts <i>after</i>	
			Inst	Norm	Inst	Norm	
		Dis/satisfaction	0	0.00	1	0.24	+0.24
	Affaat	Dis/pleasure	0	0.00	1	0.24	+0.24
	Affect	Dis/inclination	1	0.34	2	0.48	+0.14
_		Total	1	0.34	3	0.72	+0.38
		Veracity	4	1.38	13	3.14	+1.76
		Capacity	6	2.06	13	3.14	+1.08
	Indoment	Tenacity	2	0.69	6	1.45	+0.76
ATTITUDE	Judgment	Propriety	1	0.34	3	0.72	+0.38
		Normality	2	0.69	2	0.48	-0.21
		Total	15	5.16	37	8.94	+3.78
		Valuation	37	12.72	88	21.26	+8.54
	A	Composition	5	1.72	19	4.59	+2.87
	Appreciation	Reaction	4	1.38	10	2.42	+1.04
		Total	46	15.81	117	28.26	12.45
-]	Total	62	21.31	157	37.92	16.61

Table 4.1. ATTITUDE in Corpora 1A and 1B

As expected, Affect is the subsystem which displays the smallest amount of instances in both corpora (ED of 0.34 in Corpus 1A and 0.72 in Corpus 1B), with a slight increase in Corpus 1B when compared to Corpus 1A. Since Affect involves personalisation in the description of feelings and emotions (example [8]), these linguistic resources tend not to be frequent in scientific writing.

[8] [Corpus 1A. Student 18.] This project implements a beamforming filter using a linear microphone array, to extract **desired** *speech signals* in an interference-dominant, noisy environment.

In this example, the personalisation of the participle "desired" is implicit, since there needs to be a participant who determines which speech signal is the one wanted. A similar case is presented in [9].

[9] [Corpus 1B. Student 11.] This technique is very attractive, however when we **want** to change the problem we must readjust the neighborhood ordering again for find the most suitable configurations.

In this case, the personal presence of the writer is more evident than in [8], with the syntax of the statement including the personal pronoun "we", and the inclination of the researcher to change some variables in the study. Although very few Affect instances were found, these were used strategically to direct the reader into the writer's objectives. If Judgment is taken into consideration, the presence of this type of evaluation is more frequent than Affect. There are almost 9 instances per thousand words, with Veracity and Capacity displaying the highest frequency in the two corpora. They also suffered the highest increase between versions *before* and *after* the course (ED increase of 1.76 for Veracity and 1.08 for Capacity). In example [10], the writer resorts to resources to express Veracity and "validate" or confirm that the procedure is verified through a specific procedure.

[10] [Corpus 1A. Student 3.] [*The proposed algorithm*] uses a redistribution power operator which tries to keep feasible the found solutions and it **is validated** using eight problems with different characteristics taken from the specialized literature.

Example [11] also expresses the validity of the research methodology, but this is not done as explicitly as in [10], but through a discursive justification:

[11] [Corpus 1B. Student 8.] **Through the experimental evaluation and statistical analysis**, the *performances of the proposed algorithms* were **assessed** in order to analyze the sensitivity of some important parameters of the techniques.

As for Capacity, the assessment of competence and ability is presented in relation to the potential of the research process to contribute to the objective, as shown in examples [12] and [13].

- [12] [Corpus 1A. Student 25.] *Genetic algorithms* are a class of meta heuristics **capable** of achieving high quality solutions for combinatorial problems.
- [13] [Corpus 1B. Student 3.] The results from this study show that *IA_DEDP* is able to reach lower costs using fewer number of objective function evaluations than its competitors.

In [12] and [13], the evaluation is on agentless elements of the research process: "meta heuristics" and "IA_DEDP". Similar to what was observed in the instances of Veracity, the entity that is appraised most frequently is the methodology carried for the research.

When compared to Affect, Judgment is used more frequently, which seems reasonable since the entity under evaluation is the researchers' own capacities and the veracity of their doings in the research activity. Being capable of carrying out a procedure and confirming valid results constitutes an essential characteristic within a scientific community.

Considering Appreciation, Corpus 1A displays an ED of 15.81 and Corpus 1B of 28.26, with a difference of 12.45. In keeping with Hood's (2010, p. 80) claims, the clear preference of scientists to encode ATTITUDE as Appreciation becomes evident in the

corpora under analysis in this work. This type of evaluation reflects the institutionalised nature of scientific discourse to express the worth or social value of things and objects. Considering Corpora 1A and 1B, the most frequently evaluated entities are the object of study and the results obtained. Examples [14], [15] and [16] show Appreciation in terms of Reaction, Composition (Complexity) and Valuation, respectively:

- [14] [Corpus 1A. Student 6.] Moreover, it was noticed that the specimens studied, differ in at least two groups of very **remarkable** *differences* which are observed in the arrangement and size of teeth.
- [15] [Corpus 1B. Student 6.] The high-resolution images and GE tools system allows the recognition and mapping of different land features with a large level of detail. *Its editing tools geometries* are **simple** to use and therefore constitute an efficient tool for mapping at scales of detail, however, these data must be interpreted with caution because the low contrast offered by natural color composition and the presence of clouds.
- [16] [Corpus 1A. Student 11.] The results obtained through experimentation show that *SA* was **the best** performing metaheuristic.

Example [14] expresses a value ("remarkable") which refers to a value of Affect, but the emotional reaction has been detached from the experiencer and attached to the evaluated entity (the two groups of specimens) as if it were some property which the entity objectively and intrinsically possesses. As for Composition, example [15] presents how well the parts of the entity fit together, which in this case is the "editing tools geometries". Example [16] shows an instance of Valuation, the most frequently used resource in the Appreciation system: "The results" are "the best" that could be obtained employing the methodology described.

Valuation ED in Corpus 1A is 12.72 and in 1B it is 21.26, showing that this is the prevailing evaluative resource employed by writers. This type of evaluation expresses whether something is socially valued for its usefulness, worth, efficaciousness, health-giving properties or its contribution to the community, so its popularity in scientific discourse is not surprising.

While example [16] above is inscribed in the positive axis of polarity of Valuation, [17] is in the negative one. The "sa-tree" does not provide suitable results.

[17] [Corpus 1B. Student 22.] However, *the sa-tree is static*, which renders it **unsuitable** for many database applications. In this paper, we study different methods to handle insertions and deletions on the sa-tree at low cost.

Even when examples [16] and [17] are at the opposite ends of a continuum of polarity, both express how the elements under consideration are valued in terms of quality and suitability.

Valuation is the evidently predominant semantic choice in Corpora 1A and 1B. Nevertheless, this category is very broad for the categorisation of evaluation and thus, this semantic domain needs to be further detailed. If close attention is paid to the lexicogrammatical realisations identified as "Valuation", semantic areas can be identified. These are oriented to a set of highly valued properties of the most frequently appraised entities in science; that is, the Object of study itself, the Research activity (as a process and as a product) and Research ownership (Hood, 2010; 2012). Table 4.2 presents the number of entities appraised through Valuation in Corpora 1A and 1B. **Table 4.2.** Valuation and entities appraised in Corpora 1A and 1B

	Valua	tion			1A	1B	Total
	Object of study					30	45
	y sed Research	A	Process		11	24	35
		Activity	Product		11	34	45
Entity		0 1		Prior	1	1	2
Appraised			Own	Current	15	42	57
		Ownership	Ownership —	Total	16	43	59
			Other	·s'	6	15	21
				Total	22	58	80

Entities related to the Object of study are more frequently appraised with elements related to "importance", "completion" and "effectiveness" (examples [18], [19] and [20] respectively).

- [18] [Corpus 1A. Student 6.] **It is important** *to consider others postcranial characters* as: absence of ossification of the vertebral centra, heterocerca caudal fin, its caudal endoskeleton hypurals undifferentiated and lack of scales.
- [19] [Corpus 1B. Student 24.] The language supports the modelling of configurations, the calculation of their **emergent** *behaviours*, and the specification of reconfiguration scripts.
- [20] [Corpus 1A. Student 11.] In this paper a Variable Neighborhood Search (VNS) algorithms is developed to solve Unrestricted Identical Parallel Machine Scheduling Problem (UIPMS) to minimize the Maximum Tardiness objective.

Moreover, entities oriented to the Research process and product were more frequently evaluated through the semantics of "effectiveness", "efficiency", "novelty" and "veracity" (examples [21], [22], [23] and [24]).

[21] [Corpus 1A. Student 18.] Time-invariant beamforming is used to detect and estimate the signal-of-interest at the output of a sensor array by means of **optimal** *spatial filtering and interference rejection*.

- [22] [Corpus 1B. Student 20.] It is concluded that the various tools described, used in a complementary manner, allowed *a cartographic product* more **efficiently**, with greater precision and detail.
- [23] [Corpus 1B. Student 6.] Due to the low occurrence of these forms in Gondwana and especially in inland freshwater environments and its low distribution during the Cretaceous period, *this group of fishes* could be **new taxa** of lower order because they can not be attributed to **known taxa** so far.
- [24] [Corpus 1A. Student 24.] This paper presents *an approach* that consists in using the Archery language to **verify** constraints specifying the absence of architectural smells in software architectures.

In her Master's thesis, Waicekawsky (2016) mentions that "[Valuation] labels many values and it is used to appraise a great variety of entities", and for this reason it is necessary to further elaborate on more delicate systems. Based on her analysis of Discussion sections in SRAs in the disciplines of Audiology and Psychology, Waicekawsky (2016) proposes the following subclassification (Graph 4.1).



Graph 4.1. An extended model of the domain of Appreciation for the analysis of scientific genres (Waicekawsky, 2016)

Credibility includes wordings such as "real", "truthful" and "true", while Suitability involves realisations like "appropriate", "suitable", "fit", and "acceptable", among others. Along the same line, and taking into consideration the semantics of the realisations of Valuation identified in Corpora 1A and 1B, labels in Graph 4.2 are proposed to further increase the level of delicacy of this subsystem (boxes display the most frequent realisations in the corpus, found with the assistance of the UAM Corpustool).



Graph 4.2. Semantic areas identified within the subsystem of Valuation

It might be risky to present the categories in Graph 4.2 as exhaustive or definite. A deeper study of meanings under Valuation might be necessary, since this proposal is restricted to realisations found in students' abstracts. However, the value of effectiveness, efficiency, novelty, veracity, appropriacy, preciseness, completion and importance within the sciences cannot be denied, as evidenced in students' productions.

Also relevant for the study of ATTITUDE in Corpora 1A and 1B is describing semantic domains in terms of their positive and negative Polarity, and of inscribed and invoked Explicitness (Graph 4.3).

System	Feature	Corpus 1A Abstracts <i>before</i>		Corj Abs <i>a</i> j	Norm diff	
		Inst	Norm	Inst	Norm	
Dolority	Positive	60	20.63	136	32.85	+12.22
Polarity	Negative	2	0.69	21	5.07	+4.38
Explicitness	Inscribed	47	16.16	109	26.33	+10.17
Explicitless	Invoked	15	5.16	48	11.59	+6.43

Table 4.3. Polarity and Explicitness in Corpora 1A and 1B

Lexicogrammatical polarity realisations show a clear preference of writers to evaluate entities positively (ED of 20.63 in Corpus 1A and 32.85 in Corpus 1B) rather than negatively (ED of 0.69 in Corpus 1A and 5.07 in Corpus 1B). Example [25] shows the positive attitude of the writer in the attempt to evaluate optimization problems through careful study:

[25] [Corpus 1B. Student 8.] The *optimization problems* related to special geometric configurations are **interesting** to research due to their use in many fields of applicability.

In [26] and [27], negative polarity has been employed to signal a void in knowledge, so that students can explicitly occupy the identified niche of research.

- [26] [Corpus 1B. Student 9.] This task is growing in importance in different research areas, such as security and anti-terrorism, marketing and various forensic disciplines, in languages like Spanish is very important because **there are few** *studies* made so far.
- [27] [Corpus 1B. Student 8.] This discipline includes *NP-hard problems as well as problems for which efficient algorithms* for their solution have not been found. However, in either case it is necessary to provide effective techniques to readily obtain good quality solutions.

Although it might be risky to pose a sweeping generalisation based on the small corpus in this study, a tentative conclusion could be postulated. It seems that negative appraisal in the sciences contributes to a rhetorical, argumentative purpose that goes beyond the mere presentation of the purpose of study. Negative language also seems to pose a positive evaluation of the researchers' aim as he occupies the niche; i.e. when the writer justifies carrying out the current work once the need for research (Swales, 1990) had been established.

If lexicogrammatical realisations in Corpora 1A and 1B are considered in terms of explicitness, both inscribed and invoked forms of expressions have increased (ED increase of 10.17 for inscribed instances and 6.43 for invoked ones). While inscribed appraisal increased ED in around 50%, invoked cases of appraisal doubled in Corpus 1B with respect to Corpus 1A. In example [28], a positive attitude of the results of the research is expressed in the term "improvement". The writer includes the information about other results to imply a comparison of his/her own as being better than those of others.

[28] [Corpus 1B. Student 11.] Evidence of **a improvement** is shown against traditional VNS results.

In example [29], the writer highlights the feasibility of the method by mentioning that all possible limitations have properly been taken care of. In this way, the writer implies the scientific rigour of the procedures.

[29] [Corpus 1B. Student 3.] A redistribution power operator was applied to try **to keep feasible** the found solutions **taking into account all type of constraint**: power balance, transmission loss, generator limit, ramp limit rate and prohibit zones.

These cases of inscribed ATTITUDE seem to contribute discursively to the writer's self image of an experienced researcher who founds research activity on solid grounds.

Shortly, ATTITUDE analysis of Corpora 1A and 1B shows that students have used more evaluative language in abstracts *after* the teaching of the course, particularly in the case of Appreciation (Valuation). Going back to the main objectives of this research, this section contributes to the description of the language used by students in scientific discourse. The following section details the results of GRADUATION analysis.

4.1.2. GRADUATION

Corpus 1B shows an overall higher use of GRADUATION resources when compared to 1A. Table 4.4 displays the number of Force and Focus instances found in both corpora, the normalization for the ED for each corpus, and the difference in normalization between them. Students prefer to use Force resources (ED of 18.91 and 34.54 for Corpus 1A and 1B respectively) rather than Focus (11.00 and 21.01). **Table 4.4.** GRADUATION in Corpora 1A and 1B

	System	Feature	Corj Abstra	ous 1A cts before	Corpus 1B Abstracts <i>after</i>		Norm
System		i cature	Inst	Norm	Inst	Norm	Difference
		Degree of attribute	22	7.56	31	7.49	-0.07
	Intensification	Vigour of process	14	4.81	42	10.14	+5.33
	intensification	Proposal	0	0	6	1.45	+1.45
		Total	36	12.38	79	19.08	+6.70
Force		Number	13	4.47	33	7.97	+3.50
Toree	Quantification	Mass	3	1.03	3	0.72	-0.31
		Extent	3	1.03	27	6.52	+5.49
		Frequency	0	0	1	0.24	+0.24
		Total	19	6.53	64	15.46	+8.93
	Total		55	18.91	143	34.54	+15.63
		Authenticity	3	1.03	2	0.48	-0.55
	Valeur	Specificity	11	3.78	40	9.66	+5.88
		Total	14	4.81	42	10.14	+5.33
Focus		Completion	6	2.06	29	7.00	+4.94
	Fulfilment	Actualisation	12	4.13	16	3.86	-0.27
		Total	18	6.19	45	10.87	+4.68
	Total		32	11.00	87	21.01	+10.01
	Total		87	29,91	230	55,55	+25,64

Regarding Force, Intensification was used more frequently (ED of 12.38 for Corpus 1A and 19.08 for 1B) than Quantification (ED of 6.53 for 1A and 15.46 for 1B) in both corpora. Examples [30] and [31] display instances of upscaling Intensification and Quantification, respectively.

- [30] [Corpus 1B. Student 20.] For the purposes of **better** *defining low contrasted units and automate the mapping*, color compositions and supervised classification Landsat 8 images were subsequently used.
- [31] [Corpus 1B. Student 2.] *A transfer or charge* from the carbon **in all cases** and a reception of charge of hydrogen was observed.

Upscaling force was employed with higher frequency than downscaling as a resource for 'turning up the volume' (Martin, 2000a, p. 148).

Table 4.5. Scale of Force in Corpora 1A and 1B

Feature	Corpus 1A Abstracts <i>before</i>		Corj Abstra	ous 1B acts <i>after</i>	Norm	
	Inst	Norm	Inst	Norm	Difference	
Upscale	44	15.13	99	23.91	+8.78	
Downscale	11	3.78	44	10.63	+6.85	

Lexicogrammatical realisations tend to increase the Force of attributes and processes. This finding is in agreement with previous studies (Waicekawsky, 2016) as scientific writers resort to these choices to construe their statements as highly authoritative. In [30] above, the writer appraises the methodology to define "low contrasted units" by upscaling the degree of intensity of the process "define" through the item "better". In [31], the Force of the proposition is expressed in relation to amount, for the author states that the carbon transfer was carried out "in all cases", showing the preciseness in extent of the result. These contribute to the scaling of qualities, verbs and amounts to reinforce the idea of completeness.

In relation to Focus, there was a slightly higher preference to express Fulfilment (ED of 6.19 for 1A and 10.87 for 1B) than Valeur (ED of 4.81 for Corpus 1A and for 10.14 1B). Examples [32] and [33] present instances of sharpening Fulfilment and Valeur, respectively.

- [32] [Corpus 1B. Student 18.] Performance metrics were calculated to obtain information about which functions should be optimizated or parallelized and it was **found** *that the Discrete Fourier Transform* (*DFT*) *could be improved*.
- [33] [Corpus 1B. Student 6.] Further detailed analysis including postcranial and cladism studies will provide a **more precise** *classification* within this large and complex group of fish.

In [32], the completion of the process is expressed in the verb "found", asserting the final state of the results of the metrics. In the case of [33], worth in terms of specificity is expressed in the term "more precise", which evaluates the classification of fish. The tendency to sharpen rather than soften meanings is in agreement with the preference for "tuning up" in the system of Force (Table 4.6).

Table 4.6. Scale of Focus in Corpora 1A and 1B

Feature	Corj Abstra	Corpus 1A Abstracts <i>before</i>		ous 1B acts <i>after</i>	Norm	
	Inst	Norm	Inst	Norm	Difference	
Sharpen	21	7.22	64	15.46	+8.24	
Soften	11	3.78	23	5.56	+1.78	

In [32] and [33] above, writers express a sharpening of the boundaries of a categorical meaning, which is closely related to scientific activity. As the main aim of science is to provide an accurate description of reality, it is relevant that students use resources used for specifying entities and grading them according to prototypicality and preciseness.

In a few words, students deployed linguistic resources of Force to scale up intensity of processes and attributes. Along the same line, Focus realisations used align with "the degree to which they match some supposed core or exemplary instance of a semantic category" (Martin & White, 2005, p. 137). GRADUATION elements found in Corpus 1A and 1B are oriented to providing an accurate and exact account of the world, which is appropriate to and expected in the social context in which abstracts function.

While sections 4.1.1 and 4.1.2 have described the language used in students' abstracts, 4.1.3 presents the analysis from a rhetorical point of view.

4.1.3. Section analysis

As to the rhetorical components identified in the abstracts, Graph 4.3 shows an overall increase in the number of sections⁵ employed in texts *after* the course.

⁵ We refer to "section" to denote the rhetorical components found in students' abstracts.



Graph 4.3. Sections in abstracts before (1A) and after (1B) the course

Except for the Objective, which was present in all abstracts in both versions, there is a clear tendency in abstracts *after* the course (Corpus 1B) to have more sections than those previous to the training (Corpus 1A). Although incorporation of rhetorical components cannot be directly attributed to the pedagogical implementation of the SSGP, the higher number of components in corpus 1B is evidence of an increase in genre awareness. Table 4.7 below shows the presence of sections in Corpora 1A and 1B, and the difference between both.

Section	Before	After	Difference
Title	8	11	+3
Introduction/Theoretical framework	9	10	+1
Objective	11	11	=
Method	10	11	+1
Results	8	11	+3
Discussion	1	5	+4
Conclusion/Applications for future research	2	9	+7
Keywords	5	9	+4
Total	54	77	+23

Table 4.7. Comparison of sections identified in Corpora 1A and 1B

Versions *after* the course show an increase in the sections that students employed. The elements *Title* and *Results* appeared 3 more times in versions *after* the course, *Discussion* and *Keywords* were present in 4 more abstracts in versions *after*, and *Conclusion/Applications for future research* shows the highest incorporation, with 7 more abstracts including this element in versions after the course. The sections that have the largest differences are those which are oriented to the interpretation of results (Discussion) and the prospective applications of results (Conclusion/Applications), while compulsory components such as Objectives, Theoretical framework or Method suffered little increase.

The following example [34] has been taken from Corpus 1A. Rhetorical components have been identified to facilitate the analysis.

[34] [Corpus 1A. Student 18.] (Title) [Acoustic Beamforming Using a Microphone Array]

(Objective) [This project implements a beamforming filter using a linear microphone array, to extract desired speech signals in an interference-dominant, noisy environment.] (Introduction / Theoretical framework) [Such operations are useful to enhance speech signal quality for perception or further processing. Sound source localization in real time can be employed in numerous applications such as filtering, beamforming, security system integration, etc.] (Method) [Since the algorithms employed in this field require fast processing we use a System on Chip (SoC) for their implementation and evaluate different configurations in order to choose the most efficient one. We analyze the software description of the sound localization algorithm to find the functions that can be parallelized; in particular, we calculate the location of a sound source with GCC and perform the filtering with the DSB algorithm. Data is acquired using a linear microphone array at 48 kHz.]

In [34], 4 components can be identified: Title, Objectives, Introduction/Theoretical framework and Method. The following is an improved version of [34], which the student decided to re-write for the sake of the evaluation of the course. It incorporates 4 sections.

[35] [Corpus 1B. Student 18.] (Title) [Acoustic Beamforming Using a Microphone Array]

(Introduction / Theoretical Framework) [Time-invariant beamforming is used to detect and estimate the signal-of-interest at the output of a sensor array by means of optimal spatial filtering and interference rejection. This technique is useful to enhance speech signal quality for perception or further processing and can be employed in numerous applications such as filtering, beamforming, security system integration.] (Objective) [In this study, three designs based in the algorithm Generalized Cross-Correlation with Phase Transform (GCC-PHAT), were used to measure the performance of this technique using hardware acceleration on Cyclon V FPGA with ARM cortex of an Altera Arrow SoCkit.] (Method) [Data were acquired using a linear microphone array at 48 kHz. We investigated the effect to replace software functions by hardware accelerators and the final throughput in the design. Performance metrics were calculated to obtain information about which functions should be optimizated or parallelized] (Results) [and it was found that the Discrete Fourier

Transform (DFT) could be improved. The results from this study show that, on average, the throughput obtained in the hardware implementation was the 46% with 6 to 10 microphones max., due to capacity the FPGA, whereas in the software design was obtained the possibility to work with up to 12 microphones. On the other hand, in the design that uses hardware acceleration the throughput was the 36% with 6 to 22 microphones.] (Discussion) [That suggests that the hardware accelerations can reduce the workload of the processor, enabling adding more microphones to perform beamforming.] (Conclusions/Applications) [Lastly, the experimental results provide that with a few straightforward code optimizations, the ARM can sharply improve the computational bandwidth and memory throughput of a software algorithm.]

(Keywords) [Keywords: Time-invariant beamforming, GCC-PHAT, hardware acceleration, throughput microphones, FPGA, SoCkit]

In [35], Results, Discussion, Conclusions/Applications and Keywords were incorporated. It is worth mentioning that students with less expertise in scientific writing –including CONICET scholars, undergraduate and postgraduate students– incorporated up to 4 components in their abstracts, whereas more experienced writers employed only 1 more. This suggests that if novice students are presented with explicit descriptions of genres, they can very quickly incorporate rhetorical elements of which they may have been unaware before. This finding is in agreement with other studies carried out in the context of academic writing carried out in Argentina (Moyano, 2005).

If students' opinions are considered, these might add to how useful it was for them to identify components in the abstract. In the case of students' class-surveys from meeting 2, some interesting comments include the following:

Student 6: [Una actividad útil fue] El análisis del título y del abstract (nunca había pensado en las estructuras de construcción de los mismos).
Student 19: Para mí la clase fue muy buena y captó plenamente mi atención. También me hizo reflexionar sobre cómo estoy escribiendo hoy títulos y abstracts.

It seems that in the case of student 6, the revision of sections was helpful to increase genre awareness, while student 19 also comments on a conscious reflection on abstracts. These, added to the incorporation of sections in Corpus 1B, can be interpreted as signals of genre awareness which led to improvements in students' productions. In addition, in the end-of-course-survey, 12 out of 14 students thought that the activity of identifying the sections of an abstract was very useful. Finally, and triangulating this finding, in my own journal I commented (Appendix 2, page 9):

[Corpus 2C. Meeting 3.] (...) we checked the constituents of the abstract which was presented the previous class. Some divergences came up with the sections that students identified as being one constituent of the abstract or another, and some possible explanations were offered. We mentioned that some sections seem to fulfil

two purposes at the same time (for example to present the purpose of the study and some information on the methodology), and students went over their abstracts and read a few examples that were similar to the one shown in class.

Students worked with abstracts and identified constituents. In so doing, they realised that on many occasions, some sections fulfilled more than one purpose at a time. This generic awareness was possible thanks to the observation of texts from a genre approach.

4.1.4. Abstracts *before* and *after* the course: Summary

The analysis on ATTITUDE and GRADUATION showed that in Corpus 1B, students tended to use Appraisal resources more frequently. Not only were these resources more abundant, but they were also appropriately used in texts functioning in the scientific community for which they were intended. Additionally, when considering the rhetorical organization of abstracts, students' capacity to identify each section's purpose suggests that they gained a more comprehensive understanding of abstracts' components after the course. This might have led to the larger number of sections in Corpus 1B.

These conclusions not only contribute to the aim of this research of describing the language used in students' productions. They posit favourable evidence to state that the training students received in the genre-based course was effective. The results in comparisons of versions *before* and *after* the course suggest an overall improvement after the course was taught.

While section 4.1 has described students' abstracts, 4.2 presents the two sections of the SRA: the Title and the Introduction.

4.2. CORPUS 1C: SRA SECTIONS

This section contributes to establishing whether students employ linguistic and rhetorical elements presented during the course in their SRAs. Unlike the comparative analysis of abstracts, this section is essentially descriptive. Titles are presented in section 4.2.1 and Introductions in 4.2.2.

4.2.1. Titles

As part of their homework, students were asked to determine the preferred pattern ([Nominalisation], [Nominalisation: Nominalisation], [Sentence]) for Titles in the corpora they gathered. According to students' reports (see Appendix 5, page 21), the most frequent form of Titles in all disciplines was [Nominalisation: Nominalisation],

followed by [Nominalisation]. No sentences were found in students' corpora (Table 4.8).

Discipline	Pattern identified
Computer Studies	Nominalisation
Dhusias	Nominalisation
Fliysles	Nominalisation: Nominalisation
Geology	Nominalisation: Nominalisation
Palaeontology	Nominalisation: Nominalisation

Table 4.8. Title patterns found in students' collected corpora

In addition to identifying structures, and as part of the activities aimed at developing semantic sensitivity, students identified the meanings expressed in Titles of their disciplines (Table 4.9).

 Table 4.9. Semantics expressed in Titles (Corpus 1C)

Titles	produced by students	Computer studies	Physics	Palaeontology	Geology	Total
	Object of study	10	5	4	3	11
Semantics expressed	Method	8	5	0	1	14
	Purpose/Problem to solve	1	0	2	0	6
	Location (place)		0	2	1	1

In the case of Computer Studies, students reported (see Appendix 5, page 21) that titles analysed are composed of the object of study (in blue) and the purpose in carrying out the research (underlined), such as in example [36].

[36] Assessing The Performance of Different S-Metaheuristics to Solve Unrestricted Parallel Identical Machines Scheduling Problem

The fields of Physics and Physical Chemistry prefer the presence of the object of study and the methodology employed (underlined) in the investigation [37].

[37] The Adsorption of Chiral Propylene Oxide onto Pd(111): <u>A DFT</u> <u>Study</u>

In the cases of Palaeontology and Geology, the preference is on specification of the spatial location and time circumstances (underlined) which detail the object of study [38].

> [38] Unconfined flow deposits in distal sectors of fluvial distributary systems: Examples from the Miocene Luna and Huesca Systems, northern Spain

As regards students' own titles, it could be said that they followed the patterns

they identified in their corpus very closely. Table 4.10 shows the titles produced by students by field of research.

 Table 4.10. Title patterns in Corpus 1C

Tit	les produced by students	Computer studies	Physics	Palaeontology	Geology	Total
	Nominalisation	7	4	0	1	12
Patterns employed	Nominalisation: Nominalisation	3	1	2	1	7
	Sentence	0	0	0	0	0
	Total	10	5	2	2	19

It can be observed that 12 (63%) out of a total of 19 titles were written using the [Nominalisation] form, and the remaining 7 (34%) display the [Nominalisation: Nominalisation] form. Students have closely followed the conventions of their disciplines.

In the case of Computer Studies, the most frequently used pattern was [Nominalisation], which is in agreement with the identified form, and the semantics expressed involve the object of study (in blue) and the method (underlined) employed for the study (example [39]).

[39] [Corpus 1C. Title. Student 23.] Characterization of the mechanical properties of a hand through integrated sensors in a textile glove

Students in the field of Physics [40] also preferred the [Nominalisation], and expressed both the object of study and method in all their titles.

[40] [Corpus 1C. Title. Student 2.] <u>A DFT study</u> of H-assisted dissociation of CO and H2 dissociative adsorption on BCC and FCC faces of iron

Students in the area of Palaeontology (example [41]) wrote titles similar to the preferred patterns identified: [Nominalisation: Nominalisation], but instead of the colon, they used a period. They presented the object of study, along with the purpose location (green).

[41] [Corpus 1C. Title. Student 6.] Possible indicators of microbial mat deposits in a siliciclastic lacustrine environment, La Cantera Formation (Late Aptian), San Luis Basin, Argentina. An answer to exceptional preservation of delicate fossils and sedimentary structures

Finally, the student whose discipline is Geology [42] chose to present location of the object of study.

[42] [Corpus 1C. Title. Student 20.] Geomorphological Mapping of Tunuyan River Megafan. Mendoza. Argentina

It seems, therefore, that students have used forms typically employed in their fields of study. Although it cannot be claimed that students used the recurrent patterns of their discipline because of the training received in the course, it can be stated that corpus-based activities –particularly those proposed by SSGP– contributed to students' awareness of linguistic patterns. The following are students' statements expressed in class-surveys in the third meeting (Appendix 4, pages 4-65); that is, the class when Joint writing of a title was carried out.

Student 1: [Actividades útiles] Plantear y ejemplificar la escritura de un título.
[Lo mejor de la clase fue] La estructura dada para los títulos.
Student 6: [Lo mejor de la clase fue] Cuando construimos entre todos un título y analizamos todas las posibilidades.
Student 8: [Actividades útiles] Escribir un título en forma conjunta
Student 14: Es muy útil la elaboración en conjunto porque aparecen muchas sugerencias de términos que se pueden usar, como postmodificadores, verbos modales, preposiciones, y qué no es conveniente usar.
Student 18: Para mí fue positivo porque a mi me costó mucho identificar las partes y tipos de títulos, por lo tanto me gustan este tipo de actividad donde todos opinan y ayudan.

Joint writing of a title seems to have been useful for students 1, 6, 8, 14 and 18, while the linguistic analysis was also important to students 6, 14 and 18. Some students also commented on their increased awareness of the form of titles, like in the case of student 18.

To summarise, students have been able to identify the grammatical form of Titles in their disciplines, as well as to determine the semantics expressed in them. In their productions, students followed the patterns they had identified. As for the activity carried out in class in which students and teachers jointly wrote a new Title from scratch, they found it useful.

The next section deals with the second component of SRAs written by students: Introduction sections.

4.2.2. Introduction

Introductions that students produced after the SSGP implementation were analysed in terms of rhetorical moves (as described by Swales, 1990) and a set of linguistic features that were taught in class. Table 4.11 summarises the rhetorical moves identified in students' writings.

 Table 4.11. Rhetorical moves and steps in Corpus 1C: Introductions

	Rhetorical moves and steps	Number	Total
Move 1	Step 1 - Claiming centrality	14	
Establishing a	Step 2 - Making topic generalization	11	34
territory	Step 3 - Reviewing items of previous research	9	
Move 2 Establishing a niche	Step 1a - Counter-claiming	1	
	Step 1b - Indicating a gap	11	14
	Step 1c - Question raising	0	14
	Step 1d - Continuing a tradition	2	
Move 3 Occupying the niche	Step 1a - Outlining purposes	7	
	Step 1b - Announcing present research	5	10
	Step 2 - Announcing principal findings	3	19
	Step 3 - Indicating RA structure	4	
		Total	67

The most frequent strategy in students' writing to establish the territory (Move 1) and refer to the field of study was through claiming centrality (Step 1). In example [43], centrality is established through the use of "well known", which expresses how popular the use of herbicides is.

[43] [Corpus 1C. Intro. Student 21.] It is **well known** the benefits of the use of herbicide in the human live.

In the case of establishing the niche (Move 2), students resorted to indicating a gap (Step 1b) as their preferred method, as shown in example [44].

[44] [Corpus 1C. Intro. Student 1.] Although this type of user interface works well for computer skilled persons and gamers it can be an interaction **hurdle** for many of the end-users. These end-users are often less familiar with this type of computer interaction. [...] In this context, natural user interface is an attractive solution to this interaction issue.

The need for a novel user interface is established by stating that some others are difficult to use, especially for non-expert users. The student clearly identifies an empty area that needs to be filled with new knowledge. Then, the writer proposes an "attractive" solution, and fills this void.

In connection to occupying the niche (Move 3), students resorted to outlining their purposes (Step 2) as the most frequently employed rhetorical strategy.

[45] [Corpus 1C. Intro. Student 18.] By this design, **the purpose of this project is to evaluate** the viability of the implementing an acoustic beamforming using a microphone array in a SoC.

Example [45] shows an instance of Move 3-Step 2, as the writer fulfils the previously established need for knowledge and defines that the purpose of the research is to evaluate how feasible the implementation of the wireless transmission is.

Regarding the explicit explanation of the Introduction, we may claim that it generated great awareness in students, since out of the 10 samples that they submitted for correction, 4 included their own notes on the identification of rhetorical components. Example [46] is the production of one of the students of the course, which was written after the implementation of the SSGP cycle. This training session involved the explicit teaching of the genre components (Text analysis), and the Joint writing (joint construction) of an Introduction. Although some of the constituents have been mistakenly identified by the student, there is evidence of rhetorical awareness in his attempt to identify moves and steps.

[46] [Corpus 1C. Intro. Student 21.] Transport of Glyphosate trough a Lipid Bilayer: A Thermodynamic Study by Computing Simulations

(Move 1 Step 1) It is well known the benefits of the use of herbicide in the human live.

(Move 1 Step 2) Modern agriculture uses the herbicides to improve soil productivity. Allowing healthy growth of the crops, first because the presence of weeds produces a competition for nutrients that are present in soils. And secondly, many of plagues live in weeds, and may infect the crops. The most popular nonselective post-emergent herbicide in the world is Glyphosate, the commercial name is Round up[®].

(Move 1 Step 3) A considerable amount of research has investigated the secondary effects of the use of glyphosate in animals. Most of these studies are based on experimental determinations of glyphosate concentration in various organs of rats or pigs, such as liver, stomach, intestine. To our knowledge, studies on the effects of glyphosate are mainly experimental; so far we have not found theoretical studies on this topic.

(Move 2 Step 1b) However, there is steel some controversy of the dangerousness of glyphosate on animals. Some private investigations (ref) argue that, based on the mechanism of action of glyphosate, the level of dangerousness on animals is almost null. However, independent studies (ref) have shown experimentally that under certain conditions glyphosate can also be harmful to the animals.

(Move 2 Step 1c/1d) Therefore, it would be of great importance to elucidate if the glyphosate can translocate the cell membrane, penetrating to the interior of the cell. In this sense, it is extremely important to determine the types of interactions between the glyphosate and the cell membrane, at molecular level. An important theoretical tool that has acquired relevance in the last decade is Molecular Dynamics (MD) simulation.

(Move 3 Step 1a/1b) In this sense, the aim of this study is to perform an MD simulation to predict is the process of diffusion of the glyphosate through the membrane cell is thermodynamically possible.

(Move 3 Step 2) The main results obtained shows that energetically the penetration of glyphosate into the interior of the cell is unfavorable. In this regard, a novel mechanism of actuation is proposed based on different properties of the membrane cell.

As for students' perspective on the Introduction, and the explicit teaching of its moves and steps, they evaluated the activity as highly positive. The following are answers that students provided in response to the question of the activity they found useful for class 5, which is the one when the Introduction was taught.

Student 8: El modelo CARS porque nos da los posibles pasos a seguir para escribir la introducción.Student 2: El hacer la introducción en grupo fue muy útil. Las guías mostrando los "steps" también.

It seems that the explicit teaching of the rhetorical composition of the Introduction proved to be useful for students, for not only did they assess this activity as useful, but they also implemented this rhetorical analysis in their productions. They also mentioned that jointly carrying out this activity was productive.

In the case of the lexicogrammatical elements that were taught for the Introduction, it could be said that student did employ them in their productions. Table 4.12 shows instances and normalization per thousand words of linguistic resources: verb tenses, quotations, negative language use, strategies to establish centrality of the research, and strategies to occupy the niche.

Lexicogrammatical features			Norm
	Simple present	214	49.54
	Modalisation	44	10.19
Varb tangag	Simple past	26	6.02
v er b tenses	Present perfect	26	6.02
	Present Continuous	1	0.23
	Total	311	71.99
	Non-integral	33	7.64
Quotations	Integral	13	3.01
	Total	46	10.65
Establish centrality	Total	32	7.41
	Connector introducing clause	12	2.78
	Verb	5	1.16
Nagativa languaga	Noun	5	1.16
Negative language	Adjective	3	0.69
	Adverb	3	0.69
	Total	28	6.48
	Reference to text	14	3.24
Occupying the niche	1st person reference	12	2.78
	Total	26	6.02

Table 4.12. Lexicogrammatical features in Corpus 1C: Introductions

Introductions written by students exhibit the features taught in class. In the case of verb conjugation, 214 (67%) clauses were in the simple present tense, which was frequently used to describe the developments in the disciplines (example [47]). The use of modals is the next preferred choice [48], followed by the simple past [49] and present perfect [50].

- [47] [Corpus 1C. Intro. Student 17.] Due to an increasing interest in manipulating and retrieving multimedia data, nowadays the problem of similarity searching **receives** much attention.
- [48] [Corpus 1C. Intro. Student 25.] Genetic algorithms are a class of meta heuristics capable of achieving high quality solutions for combinatorial problems as the problems that **can be found** in the field of computational geometry; e.g., the Minkowski decomposition of convex polygons.
- [49] [Corpus 1C. Intro. Student 2.] Saiki et2 al. [8] **reported** a tilting angle of $55\pm2^{\circ}$ using XPD, and Dwyer et al. [9] an angle of 54.7° using NEXAFS.
- [50] [Corpus 1C. Intro. Student 9.] Recently, there **has been** growing interest in social networks like Facebook and MySpace, microblogging sites like Twitter and the innumerable facilities of chats available today have made available a lot of information provided by people from different age, gender, social status, etc.

In connection to quotations, non-integral [51] quotes were more frequent than integral [52].

- [51] [Corpus 1C. Intro. Student 25.] More precisely, the decomposition of polygons regarding the Minkowski sum is an NP-hard problem as demonstrated in [5, 7, 13].
- [52] [Corpus 1C. Intro. Student 8.] The complexity of computing a minimum weight triangulation has been one of the most longstanding open problems in Computational Geometry, **introduced by Garey and Johnson [14]** in their open problems list, and various approximation algorithms were proposed over time.

These results are in accordance with what was discussed in class about the recurrence of use of quotations, as registered in the journal (Appendix 2, page 27).

[Corpus 2C. Meeting 5.] We asked students which of the two are more frequent in their disciplines, and most of them mentioned that the non-integrated ones.

Non-integrated quotes were more frequently used (7 per thousand words) than integrated ones (3 per thousand words), which is in agreement with students' description of their corpora. It seems, therefore, that students follow and are aware of the conventions for citations in their disciplines.

In the case of lexicogrammatical resources to establish centrality, students used a variety of terms, ranging from nouns [53] and adjectives [54] to verbs [55].

- [53] [Corpus 1C. Intro. Student 17.] Due to an increasing **interest** in manipulating and retrieving multimedia data, nowadays the problem of similarity searching receives **much attention**.
- [54] [Corpus 1C. Intro. Student 18.] For such applications, it is **crucial** to have a good acoustic interface in order to provide **accurate** voice control or smooth hands-free audio.
- [55] [Corpus 1C. Intro. Student 1.] Currently, users **demand** much from virtual character creations. They **want** them to be responsive; that is, they **must respond** to the human user as well as other unexpected events in the environment.

Students have been able to establish the importance of their research by resorting

to a variety of resources which express the necessity to investigate. They have done so

by expressing negative meanings [56] about the need for knowledge in an area.

[56] [Corpus 1C. Intro. Student 1.] **Unfortunately**, many traditional 2D input devices (e.g. keyboard and mouse, joystick) are **unsuited** to tasks required in 3D applications, as they require a mapping from 2D input to 3D positions in space. Many users find them **unwieldy** and **unnatural** to use in 3D applications.

Students have also been able to employ resources such as deictics, which refer to

the SRA itself and first person pronouns [57], to occupy the niche.

[57] [Corpus 1C. Intro. Student 2.] **In this work we** have carried out comprehensive DFT computations of the adsorption, dissociation, and desorption of CO and H2 to investigate and compare the direct vs. H-assisted CO dissociation mechanism on Fe (100) and Fe (110) surfaces respectively.

Although the use of lexicogrammatical features taught in the course does not necessarily mean that students did so because of the implementation of the genre pedagogy under study in this work, they mentioned that the explicit teaching of these features during the fifth class was indeed valuable.

Student 9: Me gustó las frases que más se usan en las diferentes partes de la introducción.

The description of rhetorical components of the Introduction and frequent lexicogrammatical elements in students' productions do not establish a direct causal relation between the SSGP and its effectiveness for the teaching of writing. Nevertheless, it might be stated that it contributed to students' awareness of these contents. Many of them made positive comments about the methodology in the class-survey for class 5, when the Joint writing of the Introduction took place.

Student 5: [Una actividad útil fue] Construir en conjunto una intro, revisar cómo está conformada.

Student 9: [Lo mejor de la clase fue] Escribir una introducción entre todos. **Student 15:** [Lo mejor de la clase fue];La introducción desarrollada en forma cooperativa! 85

Student 21: Lo mejor de la clase fue la escritura e conjunto de la introducción utilizando el "esqueleto" propuesto. Porque demostró cómo construir la introducción que es una de la mayor dificultad al escribir un paper.

From these, it is relevant to highlight that students found the Joint writing of the Introduction either "useful" or "the best" of the class. In participative activities like Joint writing, students greatly expose themselves with a high chance to lose face. In the case of expert researchers and advanced undergraduate and postgraduate students, for whom academic competition is at stake, making contributions in front of other colleagues represents a risky exposure. Contrary to expectations, teachers in front of the students, leading the class and asking everybody to participate, contributed to the creation of a friendly environment in which everyone could take part. It seems, then, that the methodology proposed by the SSGP is helpful for students in academic and scientific environments when learning how to write a section of the SRA in a foreign language.

4.2.3. SRA sections: Summary

Students' SRA sections display linguistic and rhetorical patterns identified and taught during the course. Regarding Titles, students produced texts which closely resembled the grammatical patterns identified in their corpora, and expressed the most recurrent semantics identified in their fields of study. This is evidence of students' genre awareness as well as a developed insight into grammar patterns. As for Introductions, the texts analysed exhibited rhetorical components of the CARs model, with some students attempting to identify moves and steps. Linguistic resources frequently found in Introductions were appropriately used in students' discourse, with strategic use of negative language and deictics, to establish the territory, signal and occupy the niche. Additionally, students found Joint writing activities useful, both in the case of Title and Introduction writing.

4.3. STUDENTS' SCIENTIFIC DISCOURSE: SUMMARY

Briefly stated, Chapter 4 has dealt with the results of Corpus 1; i.e. the description of students' scientific discourse. Graph 4.4 summarises the main results for this Chapter.



Graph 4.4. Summary of results for Corpus 1

In the case of abstracts, a comparative study was carried out between versions *before* and *after* the course. Second versions exhibited a higher number of both ATTITUDE and GRADUATION resources, and an increase in the variety of rhetorical components. As for SRA sections, students produced Titles which followed the patterns identified in their disciplines. Students were also able to identify rhetorical components in the Introduction and deploy the linguistic features taught for this section. These results contribute to one of the main objectives of this work, which is to describe students' scientific discourse. In the next chapter, findings of the analysis of Corpus 2 are presented.

Chapter 5. RESULTS AND DISCUSSION ON CORPUS 2: STUDENTS' RESPONSES

While Chapter 4 involved results on scientific texts produced by students (Corpus 1), Chapter 5 deals with response texts (corpus 2). Section 5.1 presents students' responses to class-surveys (Corpus 2A), and section 5.2 deals with students' responses to the end-of-course survey (Corpus 2B). Although teacher journals (Corpus 2C) were not analysed in depth, sections were selected and included in the results and discussions of Corpora 2A and 2B for triangulation when relevant. These three sets of data contribute to one of the two the main objectives of this research work: to assess the effectiveness of the genre pedagogy as proposed by the SSGP.

5.1. CORPUS 2A: STUDENTS' RESPONSES TO CLASS-SURVEYS

In this section, results and discussion on the analysis of class-surveys are presented. First, an overall panorama on ATTITUDE (section 5.1.1) is described considering its semantic domains. Afterwards, entities appraised negatively (section 5.1.2) and positively (section 5.1.3) are detailed.

Students answered a total of 151 surveys, which were manually analysed in terms of entities and type of appraising lexicogrammatical element used. Out of a total of 1226 questions, 662 were answered, while 564 were left blank. The more frequently answered questions were those which included an appraising element in their formulation. Those which were answered the least were questions that triggered open answers. It seems easier for students to provide a response when evaluative language is employed in questions rather than when they need to identify the semiotic element that fits with the description.

5.1.1. ATTITUDE: Subsystems

With a significantly high number, the most frequent semantic domain expressed was Appreciation (548 instances), followed by Affect (92 instances) and finally Judgment (52 instances). Table 5.1 summarises ATTITUDE in the class-surveys.

	Feature		Inst	Norm ⁶
	Appreciation	Valuation	445	54.55
		Composition	90	11.03
		Reaction	13	1.59
		Total	548	67.18
	Affect	Dis/satisfaction	68	8.34
		Dis/inclination	22	2.70
ATTITUDE		In/security	2	0.25
		Total	92	11.28
	Judgment	Propriety	31	3.80
		Capacity	19	2.33
		Tenacity	1	0.12
		Veracity	1	0.12
		Total	52	6.37
	Total		692	84.83

Table 5.1. ATTITUDE in Corpus 2A: Class-surveys

As regards Appreciation, this is the semantic domain that dominated in classsurveys. As expected, Valuation is the most recurrent subsystem, with 445 instances, followed by Composition (90 instances) and Reaction (13 instances). Valuation is usually expressed in terms like "aplicable" (appliable) and "bien/bueno" (well/good), "mejorar" (improve) and "útil" (useful). In the case of [58], the student positively valuates his decision of taking the course.

[58] [Corpus 2A. Student 21. Question 8. Class 7.] Estoy muy seguro de que *haber decidido tomar el curso* fue una **buena** decisión.

In the case of [59], the student assesses the activities of the class according to its Composition as "clear".

[59] [Corpus 2A. Student 7. Question 2. Class 7.] *Todas las actividades* me resultan muy instructivas y son totalmente **claras**.

Usually, Composition was used to appraise activities or contents of the class.

Although Appreciation dominated the evaluation students made of the course, Affect was also present in their discourse, which was expressed in terms of Dis/satisfaction (68 instances) (example [60]) and Dis/inclination (22 instances) (example [61]).

[60] [Corpus 2A. Student 22. Question 7. Class 7.] **Sería bueno** *que se armara un solo texto* en el que estuvieran presentes todas las herramientas que nos han brindado.

⁶ Normalization values are not discussed in 5.1, since this section presents results of class-surveys only. Values per thousand are used in 5.2 when class surveys are compared to end-of-course surveys.

Almost all instances of Dis/satisfaction were expressed with respect to an entity that is irrealis⁷; i.e. there is a desiderative process about a stimulus which is not real, with the writer usually showing interest on how activities, contents and materials could be improved. In [60], the student proposes gathering all the material of the course in a single document.

In the case of Dis/inclination, this was expressed mostly about entities realis; i.e. the process is related to an entity which does exist in the real world. In this case, entities appraised involved activities, contents and materials.

[61] [Corpus 2A. Student 9. Question 5. Class 7.] **Me gustó** *la lista con las construcciones* que se pueden usar en la sección Discusión.

In [61], the student states that he liked the linguistic repertoire (frequent lexicogrammatical realisations) in the materials for the Discussion section of the SRA.

Finally, the subsystem of Judgment reveals how students evaluated the participants of the course. In example [62], a student assessed whether the objectives for the class had been fulfilled, and a negative evaluation on the behaviour of teachers is invoked.

[62] [Corpus 2A. Student 14. Question 1. Class 1.] [Mis objetivos se cumplieron] Aunque **no hemos llegado a terminar** lo planeado.

The Propriety of how the teachers conducted the class and dealt with time is reproached. Even when this negative meaning is not expressed lexicogrammatically, it is implied. Students also assessed themselves in terms of Capacity.

[63] [Corpus 2A. Student 22. Question 3. Class 1.] Hasta ahora **no me** siento en condiciones de opinar al respecto.

In [63], the student does not feel he can suggest improvements for activities for the first class. In other cases when Capacity was assessed negatively, it was related to students' skills when writing in English [65] or with contents of the course [65].

- [64] [Corpus 2A. Student 10. Question 8. Class 2.] Me siento un poco olvidada del inglés, pero creo que voy a poder "ponerme a tono".
- [65] [Corpus 2A. Student 14. Question 3. Class 1.] Hasta ahora, **logré** comprender los temas discutidos.

As regards Explicitness of ATTITUDE, students preferred to express evaluation explicitly rather than implicitly (Table 5.2).

⁷ A stimulus that is irrealis involves feelings about intentions (desiderative rather than reaction), while entities that are realis entail emotive mental processes as reactions (Martin & White, 2005, p. 48).

Feature		Inst	Norm ⁸
Explicitness	Inscribed	645	79.07
	Invoked	47	5.76

Table 5.2. Explicitness of ATTITUDE in Corpus 2A: Class-surveys

Inscribed ATTITUDE, like in example [66], prevails in the evaluative language students used in the class-surveys.

[66] [Corpus 2A. Student 21. Question 2. Class 5] Lo **mejor** de la clase fue *la escritura en conjunto de la introducción* utilizando el "esqueleto" propuesto.

In the very few cases when invoked ATTITUDE was used, there was a tendency to express negative semantics. In [67], although the student is optimistic about her willingness to catch up with English, "ponerme a tono" (to catch up) signals the gap in her knowledge.

[67] [Corpus 2A. Student 10. Question 8. Class 2.] Me siento un poco olvidada del inglés, pero creo que voy a poder "**ponerme a tono**".

Overall, the system that dominated students' discourse in class-surveys is Appreciation (Valuation), more precisely when describing class activities in terms of usefulness and simplicity/complexity. Although instances of Affect and Judgment are far behind those for Appreciation, these reveal that students expressed their emotions slightly more frequently than their judgment of participants' behaviour. They stated their satisfaction of aspects they liked and their interest in the ones that could be improved. They also assessed the Propriety and Capacity of teachers and students.

The focus of the next two sections is on polarity, which allows us to determine how entities of the course are assessed. In this way, we can identify more clearly negative aspects to be improved (section 5.2.2), as well as those positive ones that are worth repeating (section 5.2.3).

5.1.2. ATTITUDE: Negative polarity

Entities that have been appraised negatively in students' discourse are the "Class"⁹, "Participants", "Time", "Writing" and the "Course". Table 5.3 shows these entities in further detail.

⁸ Normalization values are not discussed in 5.1 since this section presents results of class-surveys only. Values per thousand are referred to in 5.2 when class surveys are compared to end-of-course surveys.

⁹ Initial capital letters have been used for categories of entities identified in the corpora.

	Entity		Inst	Norm
	Contents		59	8.55
	Activities		35	5.07
Class	Materials		21	3.04
	As a whole		1	0.14
		Total	116	16.82
	Students		22	3.19
Participants	Teachers		7	1.01
		Total	29	4.20
	Duration of the cl	ass	12	1.74
Time	Length of course		3	0.43
		Total	15	2.17
	Process		3	0.43
Writing	Product		1	0.14
		Total	4	0.58
Course		Total	2	0.29
	Total		166	24.06

Table 5.3. Entities appraised negatively in Corpus 2A: Class-surveys

The Class is the most frequently assessed entity in class-surveys, with 116 instances, divided into Contents (59 instances), Activities (35), Materials (21) and the Class as a whole (1).

[68] [Corpus 2A. Student 16. Question 4. Class 3.] [Una **dificultad** con la que me encontré hoy es] *Elección de tiempos verbales* cuando es posible más de uno.

In [68], the student mentions his difficulty in selecting the right tense. Many were the students that, similarly to this statement, appraised linguistic contents such vocabulary and grammar negatively as "difficult". These covered 40 instances of the assessed contents, while 15 students referred to rhetorical contents as complex.

Among the different Activities, Grammar practice was frequently assessed negatively. When asked about the difficulties students encountered, many students found grammar exercises hard.

> [69] [Corpus 2A. Student 19. Question 4. Class 3.] *Recordar la voz pasiva*. - *Identificar los núcleos* en los títulos de mi disciplina.

In [69], the student refers to the passive voice exercise that was carried out in class and the identification of constituents in nominalisations when analysing titles. Although both were solved with the teacher, Grammar exercises represent a challenge for students.

Materials were assessed negatively, particularly Homework [70].

[70] [Corpus 2A. Student 2. Question 7. Class 3.] [Se podría mejorar] el tema de las *tareas*. No me gustan mucho porque no es muy clara. Nadie sabe bien qué hacer.

Usually, homework assignment was assigned quite spontaneously at the end of the class. Some activities in the power point slides that could not be carried out in class due to lack of time were assigned as homework. Students needed to take down notes and this information was not systematically distributed. Thus, confusion on what to do for the following class sometimes emerged.

Participants were assessed negatively as well, both Students (22 instances) and Teachers (7 instances). In the case of Students, they thought that they did not have enough grammatical or lexical knowledge (example [71]) or needed to become more involved in the class [72].

- [71] [Corpus 2A. Student 22. Question 4. Class 8.] Las **dificultades** son propias de mi *nivel de inglés* que **no me permite** aún tener claras algunas cosas.
- [72] [Corpus 2A. Student 22. Question 7. Class 3.] **Debo mejorar** *mi participación*.

In the case of Teachers, negative evaluations included the speed of the class dynamics [73] or how much time we spent on some activities [74].

- [73] [Corpus 2A. Student 20. Question 4. Class 3.] [Una de las **dificultades** es] *Velocidad de la clase*. Un poco **rápido**.
- [74] [Corpus 2A. Student 28. Question 7. Class 1.] Se podría *realizar la clase* en forma **más acotada** al introducir los conceptos y **no extenderse tanto** en los comentarios de los alumnos.

The time factor was also evaluated negatively [75].

[75] [Corpus 2A. Student 6. Question 8. Class 2.] [*La clase*] **Podría ser un poquito más extensa** así **podemos terminar mejor** con los temas.

As mentioned in the contextualisation of the course, time load for each meeting was reduced due to limited classroom availability, which partially explains teachers going fast over some contents and not being able to finish with all the materials for each class.

Since students filled in class-surveys after each meeting, Contents, Activities and Materials were immediate components to their experience, and negative aspects could be easily determined. Students were very specific about which grammar exercise or linguistic content was difficult. The complexity of grammar exercises and lack of vocabulary were frequently viewed negatively. This means that as EFL teachers, we cannot underestimate providing students with as much linguistic input as possible, and creating opportunities for practice, even when students are as experienced writers as the ones involved in this course. Students also evaluated their previous knowledge and their participation negatively, and this suggests that teachers should tend to promote confidence among students, and motivate them into keeping up with their learning. Finally, time was a factor that was criticised by students. Although the possibility to find a place for teaching the course was controlled by teachers, the amount of contents and activities could have been modified for a better flow of classes.

In the next section, entities appraised positively in class surveys are presented.

5.1.3. ATTITUDE: Positive polarity

Among the most frequent entities appraised positively, students mentioned the Class and its components (455 instances), the Course as a whole (25 instances), Writing (19 instances) Participants (17 instances) and their own Learning (10 instances) (Table 5.4).

Entity		Inst	Norm
	Activities	260	31.87
	Contents	83	10.18
Class	As a whole	66	8.09
	Materials	46	5.64
	Total	455	55.78
Course	Total	25	3.06
	Product	11	1.35
Writing	Process	8	0.98
	Total	19	2.33
	Students	11	1.35
Participants	Teachers	6	0.74
	Total	17	2.08
Learning	Total	10	1.23
Тс	526	64.48	

Table 5.4. Entities appraised positively in Corpus 2A: Class-surveys

It is not surprising that in the class surveys, students assessed components of the class or the class as a whole more frequently than any other element [76].

[76] [Corpus 2A. Student 2. Question 2. Class 6.] Todo me gustó.

Within the category "Class", "Activities" was mentioned 260 times. Thus, it is worth looking deeper into which activities students considered "useful", "clear", "interesting" and even "entertaining", particularly if we want to determine the extent to which students assessed the SSGP positively. Table 5.5 shows a detailed list of activities appraised positively in the class-surveys.

	Entity: Activities	Inst	Norm
SSGP methodology	Joint writing	46	5.64
	Text analysis	28	3.43
	Talking explicitly about SSGP	24	2.94
	SSGP as a whole	15	1.84
	Total	113	13.85
Activities in general (unspecified)		38	4.66
Discussion		36	4.41
Semantic sensitivity		23	2.82
Grammar practice		23	2.82
Class arrangement (pairs or groups)		17	2.08
Theoretical explanation		10	1.23
Total		260	31.87

 Table 5.5. Activities appraised positively in the class-survey

In the Activities category, those proposed by the SSGP were mentioned 113 times, Activities in general 38 times, Discussions 36 times, activities that developed Semantic sensitivity and fostered Grammar practice, 23 times each, followed by Pair and group activities and Theoretical explanations, with 17 and 10 mentions, respectively.

[77] [Corpus 2A. Student 22. Question 5. Class 8.] [Lo **mejor** de la clase fue] Las *explicaciones* y *discusiones* que se plantearon.

In [77], the student mentions explanations and discussions as the best activities of the class, while in the case of [78] the student provides the development of semantic sensitivity as one of the best activities.

[78] [Corpus 2A. Student 18. Question 5. Class 5.] [Lo **mejor** de la clase fue] Las sugerencias léxico-gramaticales para la redacción de una introducción y *establecer cuáles son más convencionales (más o menos negativas*, por ejemplo).

In [79], grammatical and semantic aspects to the teaching of prepositions seemed to be the most useful.

[79] [Corpus 2A. Student 8. Question 2. Class 6.] [Una actividad **útil** fue] El *uso de las preposiciones (gramatical y semánticamente)*.

In the case of [80], the student does not refer to any activity in particular, but to the Class arrangement of activities. It seems that collaborative learning is an important factor to consider when designing writing courses.

[80] [Corpus 2A. Student 10. Question 2. Class 6.] [Una actividad útil fue] *Las que tenemos que resolver grupalmente*. Siento que **aprendo** más.
Activities related to the SSGP methodology were mentioned 113 times in class surveys, which include teacher and student's joint writing activities (46 instances), text analysis (28 instances), explicitly telling students about the SSGP (24 times) and SSGP as a whole (15 instances). Since the aim of this work is to assess the activities proposed by the SSGP, it is relevant to describe how students perceive it. Students stated that SSGP activities were "useful", "interesting", or that they "liked them". Teacher-student Joint writing was the most frequently mentioned activity to have been positive within the SSGP framework (example [81]).

[81] [Corpus 2A. Student 21. Question 2. Class 5.] Lo **mejor** de la clase fue la *escritura en conjunto de la introducción* utilizando el "esqueleto" propuesto. Porque demostró cómo construir la introducción que es una de la mayor dificultad al escribir un paper.

It seems that although experienced university teachers and researchers might have some training in writing, they find benefits in doing this activity together with the teacher, in a scaffolded manner. In my journals, I noticed students' positive energy when carrying out this activity (Appendix 2, page 29).

[Corpus 2C. Meeting 5.] The work for this section was very collaborative, as students who had a better command of English tried to contribute with the words for the ideas that other classmates could only frame in Spanish. As ideas came up, Mariana helped with the typing of the Introduction into the skeleton, and I guided and organised the comments. This activity turned out to be very dynamic, productive, and even fun, as students cooperated with one another. They seemed very excited about the way in which they saw they were able to progressively produce each sentence of the Introduction. When students seemed to run out of ideas on what to say next, I asked questions for them to move on. The final production of this activity is presented in Appendix 3, on page 113.

The main characteristic that I would like to highlight from this excerpt is that the overall atmosphere was active, dynamic and enjoyable, for both teachers and students.

Apart from Joint writing, Text analysis also proved positive for students (example [82]).

[82] [Corpus 2A. Student 20. Question 2. Class 2.] [Una actividad **útil** fue] El *análisis de las estructuras de los títulos y los abstracts*. Permite entender en parte las observaciones que realizan los correctores.

Once more, teachers accompanying and guiding students intro the intricacies of sample texts has been productive for students. Similarly to Joint construction, "text deconstruction" or "text analysis" is an activity that was carried out by the teacher guiding students, asking questions and leading them into becoming aware of text structure. An important aspect of this activity was making students aware of genre variations.

[Corpus 2C. Meeting 4.] Again working in pairs, students were asked to review the

most frequent constitutive sections in the SRAs, to check whether those sections were present in their own SRAs, and state if there were similarities or differences among them. They were also asked to identify where in the SRA the objectives of the research were stated, and the verbs that make them explicit. Students then shared what they found with the rest of their classmates. They commented that in general, objectives are located at the end of the Introduction section, that they might have a section of their own, separated with a subtitle, or that they may even be identified with bullet points.

In the journal extract above (Appendix 2, page 24), I commented on Text analysis activities that help students become not just aware of text structure, but also more critical of the texts they read and write. This means that students should not "copy" sample texts because these resemble canonical structures, but they should be alert to the reasons why experienced writers decide to drift apart from prescriptive descriptions for strategic purposes.

These findings are in agreement with the work of some Argentinian colleagues (Moyano, 2011) who have also shown that *Joint deconstruction activities* as proposed by the SSGP enable students to reflect upon language and context. Students become more aware of the linguistic resources that they need for the specific social purpose of texts. Additionally, in relation to writing, which is the focus of this study, Moyano (2013) has also found that Joint construction in EFL writing is highly valued by students, and she comments on the value that genre and register awareness have for students as they become more independent writers.

In relation to the entity "Contents" (Table 5.4), linguistic elements were appraised more frequently [83] than rhetorical ones [84].

- [83] [Corpus 2A. Student 19. Question 8. Class 2.] **Me gustó** que se dieran todos esos *tips* que a veces uno no tiene en cuenta al momento de escribir como por ejemplo *las palabras a no incluir*.
- [84] [Corpus 2A. Student 26. Question 5. Class 4.] [Lo **mejor** de la clase fue] El tema de los *objetivos* [repertorio léxico] y aprender *reglas* que son muy prácticas como que *el objetivo va al final de la introducción*.

Students favoured grammar usage and assessed "rules of writing" positively. These were recommendations teachers made about language use, such as words that need to be avoided due to negative transfer, or pieces of advice such as using clear epistemic verbs in the statement of the purpose.

Among Materials, students "liked" Examples and Vocabulary repertoires, which were found "useful" (example [85]).

[85] [Corpus 2A. Student 22. Question 2. Class 7.] [Una actividad **útil** fue] La *ejemplificación* de los recursos interpersonales.

Students seem to have found the Material useful because examples contributed to their understanding of theoretical explanations about language that are very distant from their own disciplines. This constitutes an aspect that I observed in my journals (Appendix 2, page 27).

[Corpus 2C. Meeting 5.] Students were provided with a list of phrases, such as verbs like "X failed to consider", adjectives like "incomplete", and openings like "However, little information on...". Students acknowledged having seen most of the phrases before, but they thought it was really useful to have all these expressions together in a list.

Shortly, identifying entities appraised positively in the course-surveys –such as Joint writing and Text analysis activities, Linguistic contents, and Linguistic repertoires– is relevant for future considerations when teaching a scientific writing course. The active role of teachers interacting with students in Joint writing activities and Text analysis has proved to be highly beneficial for them, even when we consider that the target students are highly experienced in their fields. Additionally, linguistic materials, and practice on language use and grammar cannot be underestimated, since students found large benefits in doing them.

5.1.4. Class surveys: Summary

After each class, students had the chance to offer their opinions on what happened during each meeting. The different components of the class were evaluated mostly in terms of social value and worth (Appreciation, Valuation). In connection to the contribution of class-surveys to the aims of this research work, we can state that students perceive activities offered by SSGP as "useful".

It is interesting to notice that Linguistic contents were the most frequently assessed element in the negative axis of polarity, as well as in the positive axis. A possible explanation to this apparent contradiction may be that although students found some difficulties in solving language exercises, extensive practice –together with language repertoires and input, intensive grammar and vocabulary activities were appreciated the most by students since they contributed to completing their gap in knowledge.

Finally, the most frequently appraised activities in the positive axis of polarity were Joint writing and Text analysis, as proposed by the SSGP. It seems that activities in which teachers accompany students are suitable for the teaching of scientific writing, even when the target audience is a group of university teachers, researchers or advanced undergraduate and postgraduate students with plenty of professional expertise.

In what follows (section 5.2), results on the end-of-course surveys are presented. These throw light on students' perceptions after the course was over, and after they gained some perspective on the training.

5.2. CORPUS 2B: STUDENTS' RESPONSES TO END-OF-COURSE SURVEYS

This section explores the results of Corpus 2B, composed by students' answers for the survey carried out at the end of the course. Sections 5.2.1, 5.2.3 and 5.2.2 discuss students' discourse (Type A questions) in terms of the system of ATTITUDE, and in terms of negative and positive polarity, respectively. Section 5.2.4 deals with multiple choice questions whose answers are arranged in terms of GRADUATION (Type B questions).

5.2.1. ATTITUDE: Subsystems

Regarding the evaluation resources that students used in their answers to the endof-course surveys, Appreciation is the most frequently used system of ATTITUDE, with 242 instances (Table 5.6), while Judgment and Affect display 25 and 20 instances, respectively (see Table 5.6).

Feature			Inst	Norm
	Appreciation Appreciation <u>Reaction</u> Total	Valuation	221	54.39
		Composition	18	4.93
		Reaction	3	0.71
		242	57.44	
ATTITUDE	Judgment	Capacity	12	3.04
		Propriety	10	2.49
		Tenacity	2	0.52
		Normality	1	0.28
		Total	25	5.93
		In/security	15	3.56
	Affect	Un/happiness 3	3	0.71
		Dis/satisfaction	3	0.71
		Total	21	4.98
	Total		288	68.36

 Table 5.6. ATTITUDE in Corpus 2B: End-of-course surveys

Appreciation will be dealt with in more detail because of the larger number of instances, while some examples on Judgment and Affect are presented.

In the case of Appreciation, the most frequently used resource is Valuation (221 instances), followed by Composition (18 instances) and Reaction (3 instances).

Similarly to class-surveys, it is not surprising to find such great difference between the three domains, since Appreciation refers to the evaluation attached to semiotic objects because of their social values such as usefulness and efficaciousness.

[86] [Corpus 2B. Student 1. Question 16] Me resulto **muy eficaz** ser consciente de que tiempo verbal se utiliza en cada proceso de la escritura, y justificar porque usarlo.

In [86], "muy eficaz" (very effective) appraises the student's awareness of the contents, more precisely, verbal tenses. "Usefulness" is a very frequent semantic domain in the assessment of the course. As for the other subsystems of Appreciation, these are not as frequent as Valuation. Example [87] corresponds to Composition, i.e. how the parts of an entity fit together.

[87] [Corpus 2B. Student 22. Question 3.] Aunque **no me fue muy fácil** *asistir a las clases*, por otros compromisos existentes, creo que debería ser mayor el número de horas presenciales.

In this example, the evaluation is related to the student's own involvement with the course as he expresses how difficult it was for him to attend classes.

Reaction is related to an emotional response of the human being to an entity [88].

[88] [Corpus 2B. Student 9. Question 27.] A mi me resulto **muy interesante** para los investigadores especialmente para los que recién se inician que no tienen mucha idea de como realizar un paper.

In [88], the student appraises the course as "very interesting", ascribing this value to the course as a whole and how it engaged its audience, especially for students who were starting in their writing process.

As to the second system of ATTITUDE, Judgment, the semantic domain of Capacity is the most frequently expressed (12 instances). It is generally employed to refer to student's ability to write, or to what they feel they can do after the course [89].

[89] [Corpus 2B. Student 26. Question 29.] Creo que fue una grata experiencia. Tal vez **no me voy siendo una experta** pero si siento que **he aprendido** mucho en este curso.

The student acknowledges that she is not an expert when it comes to writing in English, and in this way appraises her own capacity as not fully developed but, at least, as improved since she has learnt a lot.

In the case of the third subsystem, Affect, some cases of In/security could be found (15 instances).

[90] [Corpus 2B. Student 23. Question 17.] Si me sentí **acompañada**, los docentes siempre estuvieron **dispuestos** a escuchar y responder nuestras dudas.

In [90], the student stated that she felt accompanied throughout the course. Most

of the In/security instances are answers to a question in the online form that explicitly asked students whether they felt teachers accompanied them. Students in general valued teachers very positively, especially when referring to the possibility of feedback and communication.

With regard to the Explicitness of ATTITUDE in the end-of-course surveys, it can be stated that students used inscribed evaluation more frequently than invoked (Table 5.7). These results are similar to those in the class surveys.

Table 5.7. Explicitness of ATTITUDE in Corpus 2B: End-of-course surveys

Feature		Inst	Norm
Engligitages	Inscribed	223	52.93
Explicitless	Invoked	77	Norm 52.93 18.28

Students prefer to express Appraisal in a direct manner. While in [91] the positive evaluation is expressed in the semantics of the words "muy útil" (very useful), the negative evaluation on how teachers should regulate the time for activities [92] is evoked through the modal "debería" and the use of the passive voice.

- [91] [Corpus 2B. Student 9. Question 26.] Me resulto **muy útil** *el ejemplo* que se suministró para tener una idea que se tenía que realizar en la reflexión.
- [92] [Corpus 2B. Student 8. Question 30.] Si bien es importante conocer lo que sucede en cada disciplina, **se debería tener más control** sobre *cuánto tiempo* brindarle a ese tipo de actividad ya que eso consumió demasiado tiempo.

Usually, invoked evaluation has been employed for negative meanings, since this manner of expression is more polite. Students knew that teachers would read their assessments on the course, and resorted to resources which indirectly express criticism, like in the case of [92].

Shortly, the system of ATTITUDE informs us on the type of evaluation that students made on the course. Just like for class surveys, the most frequently expressed meaning is Appreciation (Valuation), i.e. the course was assessed for its social value and usefulness. If these results are compared to the class-surveys, students have employed the same proportion of Valuation resources (Class-survey ED 54.55 and End-of-course ED 54.39), but there are more noticeable differences with the other two domains of Appreciation. While in the class-surveys (Corpus 2A) Composition had an ED of 11.03, in the end-of-course (Corpus 2B), Composition ED was 4.93. It seems that once students finished the course and gained some perspective with time, they did not refer to course components as "complex" or "difficult". The same tendency can be observed

with Reaction. The value in Corpus 2A was 1.59 while in Corpus 2B, it was 0.71, which makes emotional responses less frequent, probably due to the distance between the entity appraised (the course) and the moment in which students make the evaluation.

This section has presented results in terms of ATTITUDE and its subsystems. The following sections present entities in the end-of-course surveys which students appraised negatively and positively.

5.2.2. ATTITUDE: Negative polarity

Among negatively appraised entities in the end-of-course surveys, we can find Time (27 instances), Participants (24), the Evaluation of the course (13), the Class (9) and Writing (4) (summarised in Table 5.8). Due to length constraints of this work, only the first three most frequent entities will be dealt with in detail.

	Entity	Inst	Norm
Time	Duration of classes	18	4.97
	Frequency of meetings	6	1.66
Time	Length of course	3	0.83
	Total	27	7.45
	Students	18	4.97
Participants	Teachers	6	1.66
	Total	24	6.62
	Linguistic reflection	9	2.48
Evaluation	Abstract	4	1.10
	Total	13	3.59
	Activities	3	0.83
Class	Materials	3	0.83
Class	Contents	3	0.83
	Total	9	2.48
	Products	3	0.83
Writing	Process	1	0.28
	Total	4	1.10
	Total	77	18.28

Table 5.8. Entities appraised negatively in Corpus 2B: End-of-course survey

The entity that has been evaluated more frequently is Time (27 instances), in terms of the Duration of the classes (18 instances), the Frequency of the meetings (6 instances) or the Length of the course (3 instances).

[93] [Corpus 2B. Student 6. Question 28.] [Algo para mejorar es] Mas horas de cursada, ya que algunos temas y actividades que debíamos hacer en la misma no llegaron a concretarse.

In response to the question of what they would improve, students usually referred to adding more time to each class [93], since in their view, this would have allowed to study all the contents better. As mentioned in the contextualisation of the course, the original schedule included 3 hours per meeting, which was drastically reduced to 2 due to room availability.

Among other entities evaluated negatively, we find Students themselves (18 instances).

[94] [Corpus 2B. Student 12. Question 17.] [Me sentí] totalmente acompañado y contenido, porque aunque **carecíamos** de un alto nivel de inglés y de experiencia en la escritura, pudimos hacer el curso y estar en tema en todas las clases.

In [94], the student feels he was able to attend and finish the course, but at the same time, evaluates not only himself, but also the whole group of students, as not having the adequate level of English. It is interesting to notice students' self-perception of their skills in this foreign language. Although they were able to attend classes, participate, write texts in English and finish the course, some of them felt that they did not perform well enough.

One more entity evaluated negatively was the Linguistic reflection text (9 instances) that students had to produce as part of the final evaluation of the course [95].

[95] [Corpus 2B. Student 8. Question 26.] Creo que fue **más complicado** *escribir las justificaciones de las elecciones lingüísticas utilizadas* que el abstract en sí.

For some students, it was more complex to think about why they had chosen specific linguistic features to justify their writing than using them in the actual writing of the abstract. Linguistic reflection is not usual in students' academic life, which makes this type of metacognition difficult to carry out.

Negative polarity mainly refers to the Duration of classes, perceptions students had about themselves and the Final evaluation. This information is valuable for EFL teachers, since it seems necessary to spend more time in the teaching and practicing of English to build student's self confidence as regards use of the language. Additionally, it is important to support adult students who are not very confident about their skills in the EFL classroom. The group of students who took the course were teachers and researchers at university who participate in a competitive environment. Thus, as teachers, it is relevant to encourage students and to foster their confidence by looking at their achievements, and not at what has not yet been accomplished. A third point is that even when the audience is highly trained students in their disciplines, they found it hard to reflect on linguistic choices. Linguistic reflection is not a trivial activity and requires metacognitive skills that need to be practiced with teachers in class.

If we now compare class-surveys (Corpus 2A) and end-of-course surveys (Corpus 2B), we may notice that the entities most frequently appraised negatively differ. While in Corpus 2A, components of the Class (Contents, Activities) prevail, "Time" –more precisely, the Duration of the course– is the most recurrent entity in Corpus 2B. Since class-surveys were completed before students left the classroom and their class-related experiences were immediate, it was easy for them to mention Activities, Contents and Materials that were negative. In the end-of-course survey, however, students identified lack of time as something to be improved once they were able to look back into the course-experience as a whole.

In this section, negative polarity was presented. In the following segment, entities appraised positively are presented.

5.2.3. ATTITUDE: Positive polarity

In relation to the entities that have been appraised with positive polarity in the end-of-course survey, the "Class" stands out with 101 instances, followed by "Participants" (50 instances), the "Course" as a whole (19 instances), "Time" (17 instances), and "Writing", "Learning" and the "Evaluation" with 12, 7 and 3 instances respectively (see Table 5.9).

	Entity		Inst	Norm
	Activities		38	9.02
	Materials		32	7.60
Class	Contents		28	6.65
Class	As a whole		2	0.47
	Objectives		1	0.24
		Total	101	23.97
	Teachers		38	9.02
Participants	Students		12	2.85
		Total	50	11.87
Course		Total	19	4.51
	Duration of the c	ourse	16	3.80
Time	Frequency of meetings		1	0.24
		Total	17	4.04
	Products		8	1.90
Writing	Process		4	0.95
		Total	12	2.85
Learning Total		7	1.66	
	Linguistic reflect	tion	2	0.47
Evaluation	Abstract		1	0.24
		Total	3	0.71
	Total		209	49.61

 Table 5.9. Entities appraised positively in Corpus 2B: End-of-course survey

If we bear in mind the components of the Class, Activities were appraised positively 38 times, Materials 32, and Contents 28. Within "Activities", students recurrently mentioned those which developed semantic sensitivity and practised grammar [96].

[96] [Corpus 2B. Student 12. Question 16.] [Mencione una actividad **útil**] Las *actividades* para *elegir los verbos adecuados para mitigar o dar énfasis* a ciertas cosas. El *uso de los artículos*. Cuándo va *The, A/An* o no va nada. El uso de los *tiempos verbales* y la *impersonalidad* dependiendo de la sección. Me resultaron **efectivas** porque me hicieron poder ver las cosas desde otro punto de vista. Tal vez si no hubiera hecho el curso, o no las hubiera notado o no sabría la razón de por qué se usan.

The student refers to activities which practise grammar and develop semantic sensitivity (such as deciding on the Force and Focus of epistemic verbs) as "useful". They proved to be effective since –in the student's own words– she would not have realised why some tenses are used instead of others. The need to foster semantic sensitivity is something which I also noticed during the course (Appendix 2, page 28).

[Corpus 2C. Meeting 5.] Also related with citing, we paid attention to the tenses of

the reporting verbs that are used in SRAs. Present Perfect displays generality and continuity in the topic, Simple Past expresses truth about a particular event, while Simple Present shows results that are relevant up to the current moment. Students commented again that they had never paid attention to the tense of their reporting verbs, and that it was a very subtle way to position themselves in the writing of their papers.

This type of activity in which students reflect upon the language that they use is relevant if the aim of the training is to develop their writing skills and to provide them with resources to position themselves within a larger community. This need has also been identified by researchers (Amaya, 2013), since it is crucial for teachers to foster student reflection about the systems of language in order to improve the performance of their discourse.

As for Materials, students praised those which summarised what was taught in class: Slides, Linguistic repertoire and lists of websites and resources [97].

[97] [Corpus 2B. Student 22. Question 27.] Creo que realmente me aportó elementos valiosos. Los de mayor utilidad posiblemente sean la información brindada en las *Worksheets*, las *transparencias*. Aunque el *software* y *vínculos de interés* posiblemente a futuro sean de mayor utilidad cuando uno se acostumbre a su uso.

In [97], Materials such as the Worksheets, Slides, Corpus software and Websites are praised because they were evaluated as useful by students when they need to write an SRA in English. This type of "lists" and "ready-to-use" phrases, along with websites for consultation, were highly valued.

One more component of the class is "Contents". Those related to rhetorical organization of texts, as well as linguistic concepts, were frequently appraised positively. Examples [98] and [99] are answers to the question: "Do you think the course provided you with valuable elements for writing? Which do you think are the most useful?"

- [98] [Corpus 2B. Student 3. Question 27.] Si, me aportó *elementos* valiosos, los tiempos verbales de cada sección es lo que más rescato del curso.
- [99] [Corpus 2B. Student 20. Question 27.] Si. Unas de las cosas más valiosas fue para mi *la estructuración del texto científico* y su *relación con tiempos verbales, frases o palabras que fortalecen o debilitan una expresión*.

In both [97] and [98], students value linguistic contents, particularly identifying the most recurrent verb tenses for each rhetorical component of the SRA. In the case of the second example, the student also mentions the linguistic repertoire for graduating the force of utterances.

It is relevant to look into the categories under "Activities" because one of the aims

of this research work is to determine whether those proposed by the SSGP are effective. Table 5.10 displays a detail of the activities that students appraised positively. Together, SSGP activities (Text analysis and Joint writing) were mentioned 16 times, followed by exercises for the development of semantic sensitivity (11 instances), grammar practice (10) and pair-activities (1).

Entity		Inst	Norm
	Text analysis	9	2.14
SSGP methodology	Joint writing	7	1.66
	Total	16	3.80
Semantic sensitivity	11	2.61	
Grammar practice	10	2.37	
Class arrangement (pairs)		1	0.24
Total		38	9.02

Table 5.10. Activities appraised positively in Corpus 2B: End-of-course survey

As mentioned before, semantic sensitivity and grammar exercises proved to be useful for students (see example [96]). Looking into activities that the SSGP proposes, both Text analysis and Joint writing are perceived as useful to improve students' writing. In [100], Text analysis helped the student to realise what his own mistakes were, and to identify ways to improve his production.

[100] [Corpus 2B. Student 23. Question 16.] [Una actividad **útil** fue] Con el *análisis de ejemplos* yo pude ver como escribían los demás (autores de artículos bien hechos) y darme cuenta en qué fallaba yo.

Similarly, in [101], the student mentions that Joint writing has contributed to establishing a basis on which to build future writing.

[101] [Corpus 2B. Student 18. Question 16.] [Una actividad particularmente **útil**] Las *actividades de escritura conjunta* en las que se nos daba un modelo para completar, ya que sirve para practicar y da base para futuras producciones, hasta que uno haya adquirido entrenamiento y pulido sus errores más comunes.

Joint writing seems to develop students' writing and foster their confidence, since students "rehearse" those skills that will be required in their academic environment in the safety of the classroom.

One of the most frequent entities assessed positively was "Participants", more precisely, Teachers (38 instances) [102].

[102] [Corpus 2B. Student 9. Question 17.] Si, [me sentí acompañado por las docentes] con las correcciones de las actividades y siempre predispuestas para consulta.

Usually, the comments in relation to teachers referred to whether students felt

accompanied, whether teachers were knowledgeable and willing to answer questions, or whether the activities in class had been carried out properly.

In short, the entity that was appraised positively the most frequently in end-ofcourse surveys is Activities, particularly Text analysis and Joint writing. Although teacher-guided activities might be perceived as mining students' independent actions, they were perceived positively, which is reinforced by students feeling accompanied by teachers along the course. Text analysis has contributed to increasing students' awareness of SRA genre structure and recurrent lexicogrammatical realisations, while Joint writing seems to build their confidence as they are gradually "walked through" the process of writing. It can be concluded that teacher accompaniment is desirable when learning scientific writing, even for a highly specialised audience like the one in this study. Furthermore, materials which include lexicogrammatical repertoires, and linguistic and rhetorical contents were also important for students. This makes the design of materials and selection of contents to be aspects of careful consideration.

If class-surveys (Corpus 2A) are compared with end-of-course surveys (Corpus 2B), we find that "Class" is the most frequent entity appraised positively, with an ED of 55.78 for Corpus 2A and an ED of 23.97 for Corpus 2B. This large difference can be explained on the grounds that class-surveys systematically required students to give their opinions on each of the 8 meetings, and students could think of their immediate experience of the class. The end-of-course survey, on the other hand, required students to look back into the course, which may explain the lower frequency of references to class-related entities. If the Class is considered, Activities were the most recurrent element in both corpora, with an ED of 31.87 for Corpus 2A and an ED of 9.02 for Corpus 2B. In both corpora, Text analysis together with Joint writing outnumber any other activity appraised positively. This makes activities proposed by the SSGP highly recommendable to be used for academic and scientific writing in higher education contexts similar to the one in this study.

So far, sections 5.2.1, 5.2.2 and 5.2.3 have presented students' answers to Type A questions. Section 5.2.4 below examines students' answers to Type B questions in terms of GRADUATION; i.e., how students ranked class components in a fixed scale. For the sake of analysis for Type B questions, the elements under consideration are two of the most frequently mentioned entities in Type A questions: contents and activities.

5.2.4. GRADUATION

Type B questions in the end-of-course survey involved choosing answers from a fixed set of options, organised in terms of GRADUATION [Degree of completeness: Force: Quantification: Extent]. Students selected the answer from a predefined set. Although the survey involved a larger number of aspects, the ones discussed in this work are those that strictly contribute to the aims of the investigation, and that serve for the triangulation of data obtained in Type A questions. The elements under analysis are contents (linguistic and rhetorical) and activities.

As for Contents, Graph 5.1 shows how many students (vertical axis) graduated Linguistic contents (horizontal axis) according to their usefulness.



Graph 5.1. GRADUATION of linguistic contents of the course

All of the students (14) who answered the end-of-course survey ranked the identification of verb tenses in abstracts as "very useful". Additionally, 11 students had the same perception about resources to express purpose and establish centrality in the Introduction. These results are in agreement with those in sections 5.1.3 and 5.2.3, in which linguistic contents and repertoires were positively appraised in class and end-of-course surveys. What this section adds to previous analysis is the systematic organisation of contents according to students' perceptions of what they consider a priority.

As for rhetorical contents, Graph 5.2 exhibits how students evaluated the teaching



of obligatory or optional components in the abstract and SRA in terms of usefulness.

Graph 5.2. GRADUATION of rhetorical contents of the course

Out of the 14 students who participated in the survey, 13 thought that obligatory and optional components in the abstracts were "very useful". In decreasing order of usefulness, students mentioned the teaching of the Title, obligatory and optional sections in the SRA, research objectives and the Conclusion.

Overall, rhetorical contents have not been assessed as highly as linguistic ones. This may be interpreted as something that teachers do not need to emphasise so much when the audience is as experienced in the research genres as the one participating of the course. More emphasis should be put, then, on linguistic contents.

Almost all of the students ranked the rhetorical components of the abstract with the highest category available. This may be related to the fact that students need to write this genre very frequently, more often than they write complete SRAs. The Title was also very important for them, since they perceive this component as the determinant factor in a potential reader's decision to look at their productions (Appendix 2, page 7). These were comments the students had made in class.

[Corpus 2C. Meeting 2.] Then she asked students if they gave a careful thought to titles of their papers. Students said they did, for titles are the "hooks" used to make readers be interested in their writing. [...] Some questions were presented for students to discuss in pairs or small groups to activate their previous knowledge: What is an abstract? Are there different kinds? What is the purpose of an abstract? What is its audience? How frequently do you write abstracts? Students answered

these questions and commented that maybe the abstract is the most frequent genre they have to write for congresses and papers.

The Methods section occupies the 8th position in hierarchy among the rhetorical elements selected for analysis. This may be so because students are acquainted with this section, and according to what they stated in class, it is easier for them to write this standardised section (Appendix 2, page 14).

[Corpus 2C. Meeting 2.] Students mentioned that it is usually the case that they write it first because they need to specify all the details in the procedures they carried out, especially when dealing with experimental processes. [...] They generally agreed that this is not a very difficult section to write because more often than not, they end up copying or paraphrasing other writer's wordings, and since this section is so standardised, copying does not necessarily mean "plagiarising".

Writing Research objectives was also ranked as very important by students (Appendix 2, page 23), since together with the Title and the abstract, these are obligatory elements that need to be presented in their texts. In class, they also highlighted the importance of producing detailed and specific Objectives.

[Corpus 2C. Meeting 4.] One of the students mentioned that in his case, it had been extremely useful to state the purpose of his investigation before starting with the experimental part, for this helped him "cristalyse" his thoughts and make his ideas concrete.

In order to be specific about the research purpose, students need to use a range of vocabulary that clearly determines what is going to be done. As mentioned in class and in the end-of-course surveys, students referred to their limitations in vocabulary. Thus, providing them with linguistic repertoires (Appendix 2, page 24) that enable them to produce text components that serve the purpose of the text is highly recommendable.

[Corpus 2C. Meeting 4] Students were then asked to make a list of at least ten verbs used to express epistemic activity. This exercise was carried out in pairs. We checked the activity orally, though in many cases, students found it difficult to provide more than five different verbs. We then showed them a list of verbs that followed the phrase "The objective of this study is to...", which were collocations taken from a real corpus. Students found this useful, as they now had a wider repertoire of lexis when writing their objectives.

The SRA sections that students ranked as their priorities are those that are either highly frequent in their academic lives or which need to be accurate and precise. These are valuable criteria when selecting the rhetorical components that need to be taught in a scientific course, particularly if there are limited resources such as staff or time.

Another relevant aspect to consider so as to determine the effectiveness of the SSGP is to look into how students evaluated the activities, particularly if we need to decide whether those proposed by the SSGP are effective. Graph 5.3 displays how

students ranked activities in terms of usefulness (horizontal axis for activities, vertical axis for number of students). In general terms, students ranked all of the activities very high.



Graph 5.3. GRADUATION of activities presented in the course

All of the students stated that identifying verb tenses in the abstract was "very useful", while 12 out of 14 stated the same about identifying abstract constituents. This is in agreement with the value students ascribed to linguistic contents (Graph 5.1) and the rhetorical constituents of the abstract (Graph 5.2).

Furthermore, the Joint construction of the Introduction and Title were assessed as "very useful" by 12 and 11 students, respectively. Two comments can be made from this. First, the section "Introduction" as a rhetorical component was not a priority for students, since this content ranked 6th in Graph 5.2. However, jointly writing an Introduction was "very useful" activity for 12 students. We might conclude, then, that it is not the rhetorical component in itself that is important for students to learn about, but rather the practice of writing together with their teacher. A second conclusion is that, in agreement with previous results in this work, SSGP Joint writing activities ranked very high in students' views and can therefore be incorporated in teaching practices when dealing with scientific writing.

Finally, Text analysis, Grammar activities, Development of lexical sensitivity and Title analysis were very useful activities for 11 students, and Joint construction of Results received this evaluation by 10 students. All in all, none of the activities proposed in the survey was assessed by less than 10 students with the highest option. It seems that all activities proposed were useful for students in one way or another.

The analysis of a selected set of options for students to assess in terms on a scale provides systematic data on elements that as researches, we might be interested in. Most students feel they were completely able to identify scientific genres like the abstract and the SRA and their constituents. They also mentioned rhetorical and linguistic contents in the abstract as very useful. Although all of the activities in the end-of-course survey received high evaluations, identification of verb tenses and constituents in the abstract proved to be useful to all of the students, followed by Joint writing activities.

The findings through the GRADUATION analysis correspond to those found in previous sections. The answers for Type B questions have served to triangulate and corroborate the information obtained in Type A questions, in which students answered through discourse and not through a fixed set of options. At the same time, sections of teacher journals have been extracted and included in the analysis for the sake of interpretation of results.

5.2.5. End-of-course-surveys: Summary

In order to sum up the end-of-course surveys analysed from the system of ATTITUDE (type A questions), it could be mentioned that students mostly evaluated the course and its components explicitly, especially using positive appraisal. They did so in terms of Appreciation; i.e. stating how useful various entities were. The entity that was most frequently perceived as negative was Time, since classes were perceived as too short for the amount of contents to be taught. If we now turn into the aspects that were positive, Teachers, Activities, Materials and Contents were appraised can be mentioned.

In the case of students' answers analysed from the system of GRADUATION (Type B questions), results corroborate the analysis of Type A questions, for Activities and Contents were graded positively. Nevertheless, some students were not so confident to provide a definite answer to whether they could identify typical lexicogrammatical resources in sections of the SRA. Future training sessions should focus both on working with the language in text analysis, so that students can become aware of linguistic resources, as well as on practicing writing texts and going beyond grammar exercises.

5.3. STUDENT PERCEPTIONS: SUMMARY

Students frequently used terms such as "useful" or "I liked" to assess the course

and its components, both in class and in end-of-course surveys. Entities such as Activities, Contents and Materials were the most highly praised, which seem to contribute to fulfilling their objective to be able to improve their writing skills and produce an SRA. Graph 5.4 summarises the main results of Chapter 5.



Graph 5.4. Summary of results for Corpus 2

Language use was perceived positively, when practice was provided, and negatively, since students felt they lacked resources to write appropriate scientific genres. Students' perceptions presented in this chapter need to be considered precisely for what they are: perceptions. Nevertheless, these views throw light upon the assessment of the SSGP methodology. We may conclude that, in the view of qualified university teachers and researchers, it is worthwhile to teach a genre-based scientific writing course, with a focus on text analysis and frequent and typical lexicogrammatical realisations. Teacher-guided Joint writing activities are also highly recommended for their incorporation as regular practices in courses like the one presented in this work. Finally, it should be mentioned that students' overall perceptions on the course were so positive that new courses had to be taught in response to students' requests.

Chapter 6. CONCLUSIONS

This chapter looks back at the objectives of the study, and refers to the methodology used to attain such aims. It also summarises the main results, states weaknesses as well as strengths of the investigation, and presents the implications of findings.

6.1. SUMMARY OF THIS RESEARCH WORK

The aims of this research work were twofold. On the one hand, it aimed at describing the language used by a group of EFL students as they wrote scientific genres. For this, three corpora were gathered: one contained abstracts that students wrote before they took a genre-based course on scientific writing. The second corpus contained abstracts written by the same students upon completion of the course. The third one included SRA sections, namely Titles and Introductions.

The second objective was to assess the implementation of a genre-based course on scientific writing. For this, a set of class-surveys was implemented for students to fill in after each meeting of the course. Additionally, an end-of-course survey was carried out, once students handed in the final evaluation of the course and had gained some perspective on the pedagogical implementation as a whole. Results obtained in both surveys were triangulated with the teacher's journals.

6.1.1. Findings on linguistic descriptions of scientific discourse

Abstracts produced by students after attending the course display Appraisal resources appropriate to the genres under consideration. If the system of ATTITUDE is taken into account, the most frequent evaluative resources are those connected to Appreciation, and more precisely, Valuation, which praises entities in terms of social value. Since this semantic domain covers a large range of meanings, it might be valuable to pose further levels of delicacy. We proposed a set of meanings based on the observation of instances of Valuation in students' productions, which by no means can it be interpreted as a definite categorisation, but rather it is a description of the semantics found in students' scientific discourse. In the case of GRADUATION resources, these tended to "turn the volume up" of processes, and intensify the force of students' practices in the investigation world, while the focus of boundaries of entities were sharpened in an attempt to better describe the objects of research. Appraisal resources

have been used appropriately in the context in which texts function, and these results are in agreement with previous studies.

Moreover, abstract versions *before* and *after* the genre-based training course were compared, and it was found that students employed a larger number of Appraisal resources in versions *after* the Genre-based training, at the same time that second versions included a wider variety of rhetorical components.

In the case of SRA components, Titles and Introductions were analysed. These sections were produced during the course, and they were described considering the elements taught. Regarding Titles, students were able to identify the grammatical form that Titles frequently adopt in their disciplines. They could also define the semantics contained in titles, and employ them in their own Titles.

Considering the Introduction section, students employed lexicogrammatical elements taught in class, particularly those to signal a void in knowledge and to occupy the niche. Students seemed to be aware of the rhetorical components of the Introductions according to the CARS model taught in class. They also identified some labels for moves and steps in their own writings, although these did not strictly correspond to the ones that they had actually produced in the texts. There is, nevertheless, an evident trace of students' genre awareness.

The results presented in this section do not just contribute to the aim of this work to describe students' scientific discourse. The linguistic and rhetorical descriptions may be related to the assessment of Genre-based pedagogies as well. Evidence of the improvements in abstracts between versions and the use of characteristic linguistic features in SRA sections posit solid grounds for stating that Genre-based courses are effective for the teaching of scientific writing.

6.1.2. Contributions to the assessment of genre-based pedagogies

The SSGP was assessed by students through class and end-of-course surveys. In both sets of data, Appreciation was the resource which was most frequently used to assess the course. Explicit evaluation prevailed, especially with positive instances, while negative ones tended to be expressed implicitly, probably to mitigate the impact these would have on teachers, since they would be the ones reading the surveys. Among entities appraised negatively, language contents and language exercises were viewed as "difficult" in class surveys, while in the end-of-course survey, time and the duration of the course ("too short") were identified. Students also perceived themselves, their participation, and their knowledge of the foreign language negatively. Considering entities appraised positively, materials that summarised language repertoires and linguistic contents, especially "rules of writing", were praised by students. Finally, Joint writing and Text analysis were found "useful" by students, both in class and end-of-course surveys.

When asked to rank elements on a scale in the end-of-course survey, most students said they were completely able to recognise different genres in the sciences, but they were not so confident about being able to identify and use frequent lexicogrammatical features in sections of the abstract and the SRA. Linguistic contents related to the abstract, particularly verb tenses typical of abstract components, ranked very high, maybe because these fill students' perceived void in their knowledge about English. Other elements students valued positively were Joint writing of the Title and Introduction.

When analysing students' answers, sections of the journal I kept were included in the discussions, since my observations not only contributed to triangulate data, but they also added narratives which shed light on what happened at different moments of the class.

One of the main concerns that I had before implementing the genre teaching cycle was that SSGP activities had been designed for contexts in which students were young (primary and secondary schools), and for adults with little or no instruction at all (immigrants and aborigine people in Australia) (Rose & Martin, 2012). Very well instructed adult learners like the ones participating in this study might have been reluctant to be led by the teacher in Text analysis and Joint writing activities. As it turned out, adults' perceptions about their writing skills in English –as well as their own linguistic repertoire– was negative. Under these circumstances, they felt accompanied and enjoyed the collaboration of the teacher in Joint writing and Text analysis activities.

There are two implications to this. On the one hand, EFL teachers need to foster confidence in our students, even when we teach in contexts like the one in this piece of research, in which adults are recognised experts in their disciplines. They see English as their weak spot, and are quite sensitive about it. One possible way to help them is by providing linguistic resources which are specific to what they do, and which can be applied to their discourse needs. On the other hand, accompanying students as they perform an activity that they are struggling with has proved to be useful for them. They do not feel undermined, but rather, they build their confidence as they notice that they

are capable of producing texts with the help of someone with expertise in the language.

Turning back into the assessment of the SSGP, it can be stated that Joint writing and Text analysis are useful activities which contribute to teaching students to write scientific discourses like abstracts and SRAs. The activities proposed by the SSGP teaching cycle were evaluated positively, and never negatively, with students' preference for Joint writing.

6.2. LIMITATIONS AND STRENGTHS OF THIS STUDY

Although some conclusions can be drawn from the analysis of students' scientific discourse, broad generalisations on the results cannot be made due to the reduced corpus of student's productions. The corpus of abstracts for versions *before* and *after* the course was limited to 11 samples, and Titles and Introductions were made up by 19 and 10 samples, respectively. Therefore, a corpus with a larger number of texts may provide more data on which to build more general conclusions.

The assessment of the SSGP was carried out based on students' perceptions about the activities this framework proposes. Only the linguistic and rhetorical improvements of abstracts *before* and *after* the course may be linked to the SSGP's teaching method, since there are two matching sets of texts to be compared. However, there is no causal relationship that can unequivocally establish the link between the implementation of the course and students' improved writing. Other sources of data, such as the linguistic description of students' SRA sections and students' answers to surveys, are partial indicators of this genre pedagogy's efficacy.

As to the strengths of this work, it could be mentioned that a variety of sources of data have been gathered. Scientific discourse entailed abstracts and SRA Titles and Introductions, while surveys were conducted at different moments: during the course and after this training finished. In order to triangulate the results, excepts from teacher journals have also been included.

In addition, although scientific discourse samples were limited in number, their value resides in their authenticity. All texts are real productions of students, which were written either soon before, during or after the course. At the same time, students' answers to surveys involved the reflections of those who are the actual beneficiaries, and their perception is authoritative as participants of the training. Moreover, the audience of this course were highly qualified university teachers, researchers, CONICET scholars and advanced undergraduate students. Because of their academic

and scientific training, they may be considered as critical and qualified informants.

Apart from the research itself and the findings that derive from it, the implementation of a scientific writing course contributed to the development of writing skills of researchers at UNSL. As an ultimate goal, the aim of both this research and the training course was to provide Argentinian researchers with some necessary tools for them to function successfully in English, and to position themselves within a larger international community.

6.3. POSSIBLE LINES OF FUTURE RESEARCH

Among the possible lines of research that may derive from this study, one that might provide valuable insights is the implementation of the SSGP in other contexts, such as in the teaching of Spanish as a mother tongue. Another potentially strategic context to implement genre-based writing is in teaching training courses. Providing teachers-to-be with good writing skills is essential for them to teach their own students how to produce high-quality texts.

A second possible line of research is to analyse *before* and *after* versions of SRA sections, including Titles, Introductions, Methods, Results, Discussions and Conclusions. It would be interesting to identify linguistic and rhetorical components that students are capable of incorporating and improve in their writings after the SSGP implementation.

Finally, it would be relevant to incorporate practices from the SSGP cycle –along with those of other genre-based pedagogies– into EFL teaching training programs. This would involve not only linguistic analysis of genres and understanding the social purposes of genres, but the interaction of teachers with students to make learning collaborative and constructive.

6.4. FINAL COMMENTS

Based on students' scientific productions and their answers to surveys, we may assess the teaching of abstracts and SRA writing through the SSGP to advanced undergraduate students and teacher-researchers at the FCFMyN as effective. Therefore, the contribution that this research work has made is to implement the SSGP in a context different from those for which it was created, and to identify which activities in the teaching cycle seem suitable for a specific group of students. It is suggested, then, that future training sessions should incorporate activities such as teacher guided text analysis for students to become aware of generic and linguistic characteristics. Additionally, teachers can implement a collaborative activity like jointly producing sections of texts. This proved to be useful for students, for not only does it build on their language skills, but it also fosters collaboration among students.

The implications of identifying positive elements of the course is that these can be replicated and improved in future training sessions. The development of semantic sensitivity and grammar practice seem to be important to students, together with Joint writing of science genres like the abstract and the SRA after Text analysis activities. Finally, Joint writing of texts seems to have been effective for students, for it was recognised as a scaffold to improve their writing skills.

With this thesis, it is my intention to have contributed to the improvement of EFL education by assessing the effectiveness of a genre pedagogy, and by identifying contents that need to be focused on and activities to be incorporated in future training practices. I also hope to have helped my colleague researchers in their pursuit of participating in the international publication sphere.

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