Teaching the Thesis genre (TFG) in Civil-Mining Engineering: Resources for Academic Writing in Spanish

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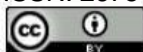Pontificia Universidad Católica de Chile, Santiago, Chile

Abstract
The undergraduate final report is a challenge for students in the final year of a studies program because this is a genre that promotes the integration of knowledge and complex disciplinary competencies necessary for a satisfactory professional performance. This applied research presents as objectives: to analyze the TFG genre and to design informed didactic resources to approach the genre. The theoretical framework is based on genre pedagogy, and it followed a qualitative methodology. Results show a type of genre that moves knowledge and abilities on academic writing in different discourse, process, linguistic and normative dimensions that have become a challenge for learning in the discipline. Therefore, a number of didactic resources were designed to face these challenges in the engineering classrooms and, as a consequence, to achieve the confirmation of the knowledge and professional identity creation.
Keywords: Communication competences. Academic writing. Writing in engineering. Academic genres. Undergraduate final report. Genre pedagogy.

Enseñanza del género Tesina (TFG) en Ingeniería Civil-Minería: Recursos para la escritura académica en español

Resumen
El trabajo final de grado representa un desafío para los estudiantes que se encuentran en la etapa terminal de su carrera universitaria, ya que se trata de un género que promueve la integración de los conocimientos y competencias disciplinares complejas necesarias para un adecuado desempeño profesional. Esta investigación aplicada tiene como objetivos: analizar el género TFG y diseñar recursos didácticos informados para el abordaje de este género. El marco teórico se basa en la pedagogía de género y la metodología es cualitativa. Los resultados caracterizan un tipo de género que moviliza conocimientos y habilidades de escritura académica en diferentes dimensiones discursivas, procesuales, lingüísticas y normativas que constituyen un reto para el aprendizaje en la disciplina. A partir de lo anterior, se diseñaron un conjunto de recursos didácticos para abordar estos desafíos en el aula de ingeniería y lograr la acreditación del conocimiento y la construcción de la identidad profesional.

Ensino do género Tese (TFG) em Engenheira Civil - Minas: Recursos para escrita académica em Espanhol

Resumo

O projeto de graduação final representa um desafio para os estudantes que estão na fase final de seus estudos universitários, pois é um gênero que promove a integração de conhecimentos e habilidades disciplinares complexas necessárias para o desempenho profissional adequado. Os objetivos desta pesquisa aplicada são: analisar o gênero TFG e projetar recursos didáticos informados por este gênero. A estrutura teórica é baseada na pedagogia de gênero e a metodologia é qualitativa. Os resultados caracterizam um tipo de gênero que mobiliza conhecimentos e habilidades de escrita acadêmica em diferentes dimensões discursivas, processuais, linguísticas e normativas que constituem um desafio para a aprendizagem na disciplina. Com base no acima exposto, um conjunto de recursos didáticos foi projetado para enfrentar esses desafios na sala de aula de engenharia e para conseguir o credenciamento do conhecimento e a construção da identidade profissional.

Palavras-chave: Competência em comunicação. Redação acadêmica. Redação em engenharia. Gêneros acadêmicos. Projeto de graduação final. Pedagogia do gênero discursivo.

1 Introduction

The educational model of the Universidad de Chile declares the development of the generic-seal competencies in order to aim at the formation of excellence with a sustained and permanent increase in the quality, equity and relevance of the University's undergraduate program. In this framework, this article aims at deepening the generic-seal competencies in conjunction with specific competencies of the career in the following two dimensions. On the one hand, the academic dimension where the skills of oral communication, written communication and research are situated. On the other hand, the professional dimension, which promotes the ability to communicate in a second language; the ability to use information and communication technologies and the ability to work in a team (UCHILE, 2018).

This is further reinforced by the institution's Equity and Inclusion Policy (UCHILE, 2014), which mandates us to move towards a more diverse training institution, whose diversity sustains quality educational processes, which allows it to break with the
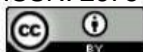
demands of a system strained by social inequality. In this sense, the discursive mastery of writing and the development of research skills is imperative to participate actively, critically and positively in society (HARVEY, 2009; CARLINO, 2013; ÁVILA, NAVARRO and TAPIA-LADINO, 2020).

Now, the courses that are located in the final or terminal cycle (Capstone project) are of great importance in the training of the engineer. They are also privileged spaces for the evaluation of the fulfillment of the graduate profiles. This type of course seeks to promote the integration of knowledge and competencies developed in previous stages. They are formative instances that seek to develop complex competencies necessary for an adequate professional performance. However, the design of these courses, as well as the implementation of methodologies and mechanisms that allow capturing evidence necessary to evaluate student performance is very complex (HIDALGO, 2016). Hence the need to systematize through research a teaching-learning methodology that can inform the formative trajectories of students in this terminal cycle.

In the university institution focused in this work, the support devices are concentrated in the first stages of the formative trajectory: Common Plan and beginning of the specialty. Since each stage of the curriculum has its specific needs, it is relevant to characterize and analyze the ecosystem of the teaching-learning process of the degree work in order to enhance academic and professional skills and catalyze an integration of learning for an effective fulfillment of the declared graduation profile.

Therefore, the question that guides this work is threefold: What are the characteristics of the Final Degree Project (TFG) genre in this subdiscipline of engineering, what is the formative role it plays and how to provide an accompaniment to the teaching-learning of the production of this genre? To answer these questions we set a double objective: to analyze the genre in the capstone stage and to design theoretically and empirically informed didactic resources for the approach of this genre in this community of practice.

Indeed, the requirements of the disciplinary communities of practice are specific and if we also consider that the nature of the institution is academically complex and geographically dispersed, it is relevant to consider disciplinary as well as transversal aspects that inform the learning of the students students for the fulfillment of the profile of

graduation: "Conceive, design, optimize and implement scientific-technological solutions in exploitation of deposits, mineral processing and extractive metallurgy" (UCHILE, 2021, s/p).

Next, the information is presented as follows: first, the theoretical guidelines on writing in the capstone stage; second, the characteristics of the discursive genres in engineering; third, a brief description of the methodology used; fourth, the main results achieved preliminarily; finally, some conclusions and final words..

The challenges of the capstone stage: background

This research is grounded in the notion of writing as a socio-cognitive process (FLOWER and HAYES, 1981; BEREITER and SCARDAMALIA, 1987; HAYES, 1996, 2012), disciplinary and academic writing (SWALES, 1990, 2004; BAZERMAN, 1988, 2005; MOTTA-ROTH, 2006; PARODI, 2010; NAVARRO, 2014) and genre-based pedagogy (BHATIA, 2002; MOTTA-ROTH, 2009; BAWARSHI and REIFF, 2010; VENEGAS, NÚÑEZ, ZAMORA and SANTANA, 2015). This theoretical and methodological platform captures the complexity of cognition and communication in the disciplines.

The capstone cycle in Engineering imposes countless challenges for the training of engineers (AUTHOR), since it corresponds to a key formative moment in the acquisition of conceptual, procedural and attitudinal knowledge that should be deployed in the industry or the world of work. This close relationship has been highlighted in recent years thanks to the processes of innovation and curricular redesign, processes that have emphasized the need to review the degree of rapprochement between academic practices and professional practices in undergraduate education. This is especially important in the development of engineers' transversal academic and professional communication skills, since in general the teaching of oral and written professional genres has been carried out with limited empirical support, i.e., with artificial texts and simulation activities poorly adjusted to the new and demanding professional contexts that the new engineers will have to face.
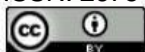
The terminal or professional cycle is important, since it considers in its curriculum the subjects that are directly related to the work of a civil mining engineer and that differentiates him/her from any other type of engineer (STAGNARO and NATALE, 2015). In this sense, the teaching-learning process of the capstone project must consider a series of academic, professional and motivational variables to verify the mastery of the complex competencies that qualify him/her as a civil mining engineer.

However, this incipient research development in Latin America also requires the development of didactic proposals that promote the acquisition and management of highly relevant professional genres in the working world. In this sense, the technical communication program of North American roots has become an educational response to these problems, but its lines of action have not permeated the engineering curricula in our countries, nor have they been adapted and contextualized to a highly heterogeneous Latin American university scenario with its own challenges.

Therefore, pedagogical devices are required to support the process of labor insertion of engineers, the process of degree work should become the first training component that supports the effective incorporation of the future engineer in complex and demanding environments so that this professional can develop technology and add value to their work for the direct benefit of society. In this way, the connection between the university world and the world of work, as well as other adjacent worlds that enrich the integral formation and the deployment of competencies in novel and multidisciplinary scenarios, should tend towards. In this sense, the Civil Mining Engineer will be able to: "Conceive, design, evaluate, implement and optimize scientific-technological solutions in deposit evaluation, geomechanics, mining, mineral processing and extractive metallurgy, as well as to manage mining operations, institutions, enterprises and projects" according to the graduate profile. (UCHILE, 2021, s/p).

Writing in Civil Mining Engineering

Engineering graduates spend 30% to 40% of their daily time writing, and professional organizations in the field consistently rank written communication skills as a key skill for all graduates. (COULTER et al., 2017). In this regard, it is important to

consider that communication and writing skills have been increasing their value as key factors in the profession in recent years. This is demonstrated by multiple investigations that have highlighted the way in which the social aspects of engineering have regained their recognition as a dimension of greater and equal importance in professional activity (FIGUEIREDO, 2008; CONRAD et al., 2016), the transformation of engineering work as a collaborative and horizontal activity (LIEVENS, 2012) and writing as a central activity in the engineer's work that requires transferring technical knowledge to broad and diverse audiences (LEYDENS and SCHNEIDER, 2009; LAX, 2014, CONRAD, 2017).

In that sense, a significant growth in the need to incorporate communication skills and the preparation to participate fully in the industry in university education can be appreciated worldwide (GASSMAN, MAHER & TIMMERMAN, 2013). Moreover, definitions in recent years of what engineering means more decidedly contemplate communication and teamwork: "communication, teams, and multiple fields impinging on design solutions, as well as a world of engineering science fundamentals and design and manufacturing practices" (DUNSMORE, TURNS, & YELLIN, 2011, p. 331).

Indeed, Knobbs and Grayson (2012) in their study on independent learning and non-technical skills in terminal students of Mining Engineering agree in pointing out that soft skills such as communication are scarce among recent graduates of this specialty. They also note a significant gap between the skills that are needed in the workplace and the skills that students have. Thus, the implementation of a non-technical learning module in the final year of the course led to a substantial improvement in both technical and non-technical skills and an increase in pass rates. These authors further report that most of the students who participated in the study noted an improvement in their overall skills and the students themselves suggest that the development of soft skills and autonomous learning should start from the first year of the course.

Chistyakova et al. (2017) in using distance learning technology for the development of language skills of students of the results have shown that these technologies positively affect the process, significantly reduce the level of panic and stress experienced by students when performing communication tasks in the traditional way, and increase the initiative and motivation of mining engineers in training. In this regard, the different researches on the development of language skills and

communicative in the training of civil mining engineers have focused on the need to strengthen the university curriculum by means of learning devices for transversal competencies such as writing and academic communication at different stages of the training process.

2 Research and action methodology

The methodology implemented is part of the applied research that is characterized by seeking the application or use of the knowledge acquired, while acquiring others, after implementing and systematizing the research-based practice. The use of knowledge and research results that gives as a product a rigorous, organized and systematic way of knowing the reality (MURILLO, 2008).

The study was carried out during the academic year 2019 in the career of Civil Engineering of Mines of the University of Chile within the courses of Introduction to the degree work and Degree work. The phases of the applied research plan are the following: 1) theoretical inquiry for the construction of the didactic material, 2) socialization and diagnosis for the survey of the TFG genre and determination of the needs of students and teachers, 3) design of a didactic proposal adjusted to the community of practice.

Theoretical Inquiry Phase 1: where the main theoretical postulates of gender pedagogy were reviewed for the elaboration of the theoretical conceptualization, the formulation of the objectives, as well as the determination of the methodological strategy and the presentation of the results of the study.

Phase 2 Socialization and diagnosis: an approach to the community was made with the purpose of knowing the writing skills of the students, their learning needs of the genre, the TFG genre, and the teaching-learning strategies deployed by the teachers for the writing task of this genre. For this purpose, two instances of inquiry were carried out: first, the undergraduate, double degree and graduate degree memoirs of the Department of Mining Engineering were collected. Indeed, corpus analysis of memoirs and memory projects in English and Spanish, between the years 2015, 2016 and 2017, was carried out. The following parameters were considered and collected in a grid analytics: *the objectives, the length, the type of report (simple traditional, traditional*
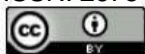
complex, topic-based, compilation of research articles), structure, citation format used, language and wording, etc.

Secondly, teachers of this formative stage were interviewed, based on a semi-structured guideline, since it enables, from a basic questionnaire, a dialogue that allows to know in depth the perceptions and knowledge of the actor facing an environment, reality or problem (DÍAZ, TORRUCO, MARTÍNEZ and VARELA, 2013). A focus group was also carried out with students who are in the process of writing their dissertation. For both forms of inquiry (interviews and focus group), protocol informed consents were prepared following ethical safeguards.

Thus, the objective of this research is to know the characteristics, needs, interests and expectations in relation to TFG through conversation with students. To carry out the interviews and focus group, two semi-structured guides were constructed: one to be applied to teachers, the other to students. The following table details the total number of interviewees:

Table 1: Total number of people consulted:

Total interviewees Teachers	Total respondents Students
8	30

After applying each instrument, one of the research assistants proceeded to transcribe the audios of each of the interviews collected. Subsequently, an exploratory study of both consultations was carried out and emerging categories were identified for coding. In this way, an analysis tree was constructed, composed of 4 categories or nodes and 8 subcategories or sub-nodes, as shown in Figure 1.

Figure 1. Tree with the categories that emerged from the semi-structured interview applied to teachers and students of the Department of Mines.

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Course curriculum process

The memory process

Contents and skills

Description of the genus

Linguistic characteristics -

Memory structure

Profile of

Strengths at

Difficulties

Evaluation

Formative

Summative

Curricular process of the

Description of the genus

Evaluation

Writing profile
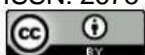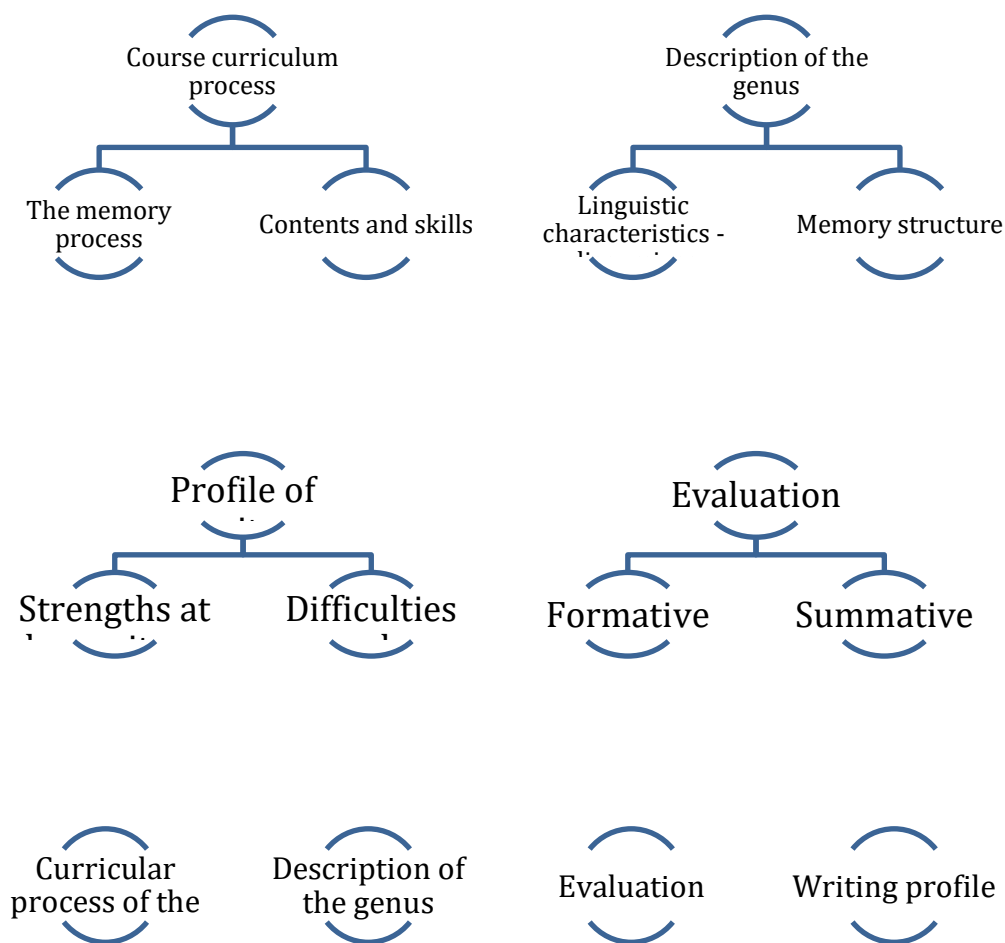
Source: own elaboration

The category "Curricular process of the course" considers the perceptions of those consulted on, on the one hand, the "Process of memory" declared in the courses taught in the career for the TFG, that is, how the research and writing process is carried out, delivery dates, work plan established with the guiding professor; on the other hand, in "Contents and skills" the contents and skills delivered in the courses.

The category or node "Description of the genre" identifies the functional structure and characteristic linguistic-discursive elements that the community declares (subcategory called "Linguistic-discursive characteristics"). In addition, the subcategory "Memory structure" collects the perception about the sections that the TFG possesses. The node "Writing profile" identifies the elements that are perceived as aspects achieved

by students in writing ("Strengths in writing") and aspects that present difficulties or are perceived as challenging in the elaboration of the memory ("Difficulties in writing" subcategory). Finally, the node "Teaching and evaluation of the TFG" identifies appraisals of the teaching of writing and how students are given feedback ("Summative evaluation") and how students perceive the TFG to be evaluated ("Summative evaluation").

Based on these categories and subcategories, we proceeded to conduct a qualitative analysis of each transcribed material. In the following section, the main findings of this analysis procedure are presented.

Phase 3 Design of the didactic proposal: based on the results obtained in phase 1 (theoretical inquiry) and phase 2 (socialization and diagnosis), a didactic proposal was built with the objective of strengthening academic writing skills, appropriating the TFG genre as a relevant communicative activity in the specialized field and applying discursive, metacognitive and procedural strategies to value the role of their production as a key competence in the graduate profile of a mining civil engineer.

This methodology enables the members of the research (teachers and advisors) to reconstruct and interpret the innovation developed, privileging the knowledge and point of view of the participants. Research of this type is oriented to problem solving (FREEBODY, 2003) and corresponds to a spiral cycle, the product of a series of iterations in which the innovations resulting from the research are applied. (ÁVILA y CORTÉS, 2017).

 3   **Results of research and action: texts, conceptions and didactic proposal.**

The analysis of the corpus allowed us to determine that most of the undergraduate final papers in the area of civil mining engineering are of the traditional complex and traditional simple type (PALTRIDGE and STARTFIELD, 2020), with a slight predominance of the former, as shown in the following table.

Table 1. Predominant types of theses in the corpus studied.

TFG Title	Type of TFG	Structure	Percentage of frequency in the corpus
Sequencing	Traditional	Canonical thesis structure traditional-	48%

optimized considering mixing rule	complex	complex: Introduction Motivation of the work Objectives Overall objective Specific objectives Scope Background Methodology Data collection and analysis Simulation on minigrids Analysis of results Conclusions and recommendations Conclusions Recommendations Bibliography Annexes	
Envelope analysis for estimation of ballast material properties of ballast material properties	Simple traditional	Introducción Antecedentes Metodología Resultados Conclusión y discusión Bibliografía Anexos	43%

Source: own elaboration

Although the great majority of the theses analyzed were written in Spanish, four were also written in English, which correspond to Master's theses for the Master's degree in Mining. Two of them are of simple traditional structure (IMRD) while the other two are of the research article compilation type. Their length is quite varied, since the compilation one has 41 pages and the other 3 range from 124 to 189 pages respectively. The greater length is based on the incorporation of references and appendices that include a large number of tables, figures, graphs and diagrams (between 20 to 30 pages). The citation format is APA; however, its application is not systematic, i.e., it is limited to the incorporation of citations in the text, but does not extend to formatting issues regarding the presentation of the list of references, spacing, font and formatting for titles, tables and figures, among others. Consequently, the 4 theses show inconsistencies in the application of this citation system.

At the discursive level, the theses demonstrate a coherent and generally quite cohesive discourse, so that the discourse is fluid and easy to understand despite the existence of grammatical errors. Notwithstanding the above, two phenomena that sometimes tend to hinder comprehension are observed in some of them: the excessive use of connectors as a cohesive tool and the presence of very long or incomplete sentences (fragments). Since the theses are written in a foreign language, all the samples analyzed present grammatical and punctuation errors of various types and frequency, although, as mentioned above, they do not significantly affect the comprehension of the message, except for particular paragraphs. The most common errors are of concordance (subject-verb), punctuation (lack or excessive use of commas) while others such as selection of appropriate tense and verb form, or errors in the use of verbs such as "allow" are less frequent, and vary according to the thesis. Since the above problems are of a surface nature, they may be due to a lack of final revision on the part of the students, which can be remedied with the creation and subsequent application of a brief and precise template (checklist) that allows a revision of these aspects in the final stage of thesis writing with the help of reliable and free digital proofreading tools.

Finally, with regard to register, all the theses show a formal register appropriate to academic discourse. In lexical terms, a mastery of technical jargon and a wide range of formal connectors are observed, while in the grammatical domain, a frequent use of passive voice (e.g., in the methodology, materials, and/or procedures section) and impersonal language (use of "se").

Students' and teachers' conceptions of the TFG genre and writing

As indicated in the methodology section, an approach was made to each discourse community in order to learn about their perceptions of the TFG and the writing of this genre. The following is a global presentation of the qualitative analysis carried out.

In relation to the curricular process of the course, it is described as a formative space declared in its syllabus, but which are courses that are not taught weekly, but rather a meeting is held at the beginning of the semester; then, a mid-term progress presentation, and a final report at the end of the semester. Each student will working the

research and writing process with their assigned guiding teacher, with whom they have the most contact. Thus, the memory process consists of each professor hosting a limited number of students to guide. In the case of undergraduate memoirs, the work plan can be more flexible and in the case of postgraduate, students are required to write a research paper and the work agenda tends to be more demanding. It should be noted that it is the guiding professor who defines the co-guiding professor for each student, as well as the evaluation committee. This is decided at the beginning of each student's research process.

In terms of Contents and Skills, it is established that in the course Introduction to the title work, students start with a work plan for their research, define the scope and objectives of the study and carry out their research and writing work until they develop chapter two (state of the art) and three (methodology). During the course Title work, each student advances their research work to the results and conclusions, they also prepare the oral defense and go back to deepen/strengthen the previous sections of the report. Those consulted highlight that this process of development of the TFG promotes in students the ability to synthesize information and ideas, the appropriation of the scientific-academic writing style, the recognition of relevant information about the secondary (hierarchization of ideas), the chaining of ideas in a logical manner, truthfulness and ethical reflection. It also generates the ability to analyze different variables, the ability of an effective bibliographic review, the ability to present what they are doing both orally and in writing. However, not all teachers who teach these courses and/or teachers who are guides or co-guides of the TFG proceed in the same way, so there is a lack of unification of work criteria.

Regarding the description of the genre, those consulted indicated that the undergraduate memoirs generally present a simple traditional structure (IMRD): a cover page, a table of contents, an abstract, a first chapter that includes the introduction (where a presentation of the topic, objectives, main scopes and structure of the document is made), a second chapter in which a bibliographical review is included, followed by a third chapter in which a bibliographical review is included. This is followed by a third chapter in which the methodology is presented. This is followed by a fourth chapter that integrates the results of the study includes a discussion. Finally, the conclusions and

recommendations. The last sections would be the bibliographical references section (according to APA or IEEE standards) and annexes. Those consulted stated that the career follows a similar trend to the logic or structure of scientific research articles. For postgraduate (master's and doctoral) memoirs, the informants maintain that these are based on research that takes the student much more time and dedication, since the topic is researched in greater depth and, generally, this research is converted into a research article in English. However, there is no consensus on what specifically is the distinction between undergraduate and graduate TFG. Regarding the linguistic-discursive characteristics, it is indicated that the language should be clear, precise and objective, typical of scientific language. As well as the use of specialized lexicon and formal language.

For the Writing Profile category, the respondents stated more Difficulties in writing than Strengths. The main strengths that stand out are the mastery of the integration of non-verbal resources to the text, such as figures and tables; in addition, the good use of concepts proper to the discipline. The following are recognized as difficulties: the ability to structure the information in each section of the report and to understand the function of that section for the reader. Likewise, it is indicated that there is a generalized tendency to not identify the main ideas for the section, so there is a tendency to overload the text with a lot of non-relevant data. Therefore, both teachers and students argue that there is a lack of knowledge of the planning process of the writer, not knowing how to select the key information per section and not knowing how to provide the text with a clear sequence of ideas. Another aspect that emerges strongly is that students do not use tools to improve their writing, such as online resources (dictionaries, spell checkers, search for sources, among others). This causes their writings to have an incomplete literature review with gaps in documentation and relevant backup; as well as spelling and writing problems. This aspect also indicates that the students of the career do not have a mastery of the textual revision process, which would allow them to detect these aspects. In the case of graduate dissertations, there is no consensus on the expected level to be reached by the student.

Regarding the Evaluation category, one of the most relevant aspects is the absence of an evaluation instrument that could be used as a support to qualify the TFG

the absence of this instrument means that each professor uses his or her own assessment judgment to grade each report. The absence of this instrument causes each professor to use his/her own evaluation judgment to grade each report. There is a tendency to make a global evaluation, considering: the writing, the presentation and the research capacity of the student and his/her attitude. However, each teacher grades based on different considerations, for example, some teachers also consider the student's compliance with the deadlines and his/her willingness to follow the work schedule.

In the case of the first course (Introduction to Degree Work), the student passes or fails the course. There is no grade, nor a protocol with the minimum established to obtain the approval. This is at the teacher's discretion according to the quality of the student's progress. In the case of the Degree Work course, the teachers who grade the course are the guiding professor and the co-guiding professor. Regarding formative evaluation aspects, it is stated that there is no protocol or work methodology established in the course to offer feedback to each memorizing student. The formative evaluation strategy is at the discretion of each professor. In the case of graduate theses, there is no evaluation instrument for grading the TFG, and there are no indications for providing feedback to students in the research and writing process; it is up to each teacher.

Didactic proposal: guides to accompany the writing process

This subsection presents the didactic proposal that aims to address the needs of teachers and students regarding the accompaniment of writing in the framework of the degree work. Next, the inputs that allowed the design of these didactic materials, the design processes and the guides are detailed and, finally, the didactic proposal is presented.

a. Inputs for the elaboration of the didactic proposal

In order to elaborate this didactic proposal, data obtained from interviews with professors and students of Mining Engineering and from the analysis of corpus of memories of the discipline were considered. The analysis of these data allowed us to to

characterize the genres related to the last stage of the students' academic-disciplinary training and to identify the needs of the students' writing memory.

Within this framework, the design of a proposal based on learning resources aimed at accompanying the students' writing process was considered. Thus, 4 self-instruction guides were proposed, whose topics were: (1) writing as a process and planning of writing, (2) rhetorical organization of the TFG genre, (3) intertextuality, and (4) linguistic aspects of the genre.

b. Design of accompanying writing guides

The design of these resources was the responsibility of the Armadillo Lab team who, based on a recursive work of planning, design and revision, elaborated a booklet with the final guides. In terms of structure, these guides were constituted as follows: (i) activation of previous knowledge, (ii) contents to be reviewed/skills to be developed, (iii) exercises and (iv) instruments for reviewing TFR writing.

The structure is based on the proposals of Kaplún (1995) and Rey, Barbosa and Gómez (2003), who suggest that self-instructional learning resources should present problems to be solved through the presentation of a cognitive dissonance, the introduction of a delimited topic, the constant exercise and, finally, offer opportunities for the audience to generate awareness of the learning obtained and the opportunity to transfer it to other learning contexts.

c. Proposal of guides to accompany the TFG writing process

Each of the guides designed to support students in the writing of the report in the context of Mining Engineering are presented below.
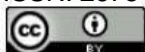
Guide 1: How can I plan the writing of my Title Paper?
The first guide aims to accompany students in the subprocess of planning the writing of their degree dissertation. To achieve this objective, writing is characterized as a process of recursive stages that begins with planning. After this, planning strategies are proposed based on the sections of the title paper and strategies for revision. finally, students are given a checklist to review whether their text is appropriate to the audience, topic and objective.

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Guide 2: Writing the Title Paper: its sections, functions and writing strategies
The second guide delves into the genre "Title Work" and characterizes it based on the data obtained in the research. Thus, in this resource, the sections of the genre are presented along with their functions and strategies to achieve the communicative purposes of each one of them. After this, students are asked to review a title paper to verify if this structure is fulfilled and to evaluate the effectiveness of the writing in the revised text.

Guide 3: Strategies for including the voices of other authors in a Title Paper

The third guide gathers intertextuality strategies that allow students to adequately include the voices of other authors in their text. Thus, intertextuality strategies are presented in two modalities: monomodal and multimodal. We have chosen to present these two modalities, since in this genre both quotations constructed by lexical and grammatical elements are used, as well as quotations composed of graphs, images, tables, among others. After presenting each of these strategies, we invite you to exercise on the use of intertextuality in this dissertation.

Guide 4: Strategies for the linguistic construction of the Title Paper

The last guide deals with the linguistic dimension of the genre. Specifically, it presents strategies for the construction of paragraphs, the writing of verbs in the methodology and the elaboration of the Title Paper summary. These strategies are presented through real examples taken from the corpus and, at the end of the exposition of each of them, you are invited to exercise them.

4 Conclusions and projections

In this paper we set out to answer the following question: What are the characteristics of the TFG genre in this subdiscipline of engineering, what is the formative role it plays and how to provide support for the teaching-learning of the production of this genre? and to meet the following objective: To analyze the genre at the capstone stage and design theoretically and empirically informed teaching resources for the approach of this genre in this community of practice.

In relation to the characteristics of the TFG genre, the qualitative analysis of the corpus allows us to determine that the most recurrent type of thesis is the simple traditional thesis. Its rhetorical organization presents introduction, methodology, results and conclusions.

In terms of requirements and difficulties, the theses of the course achieve a relevant and harmonious global coherence in relation to the research topic. However, some cohesion difficulties are observed, such as the unvaried use of connectors, the presence of sentences of inefficient construction and spelling errors. These same difficulties observed in the TFG were revealed in the consultations to the actors: teachers and students. This denotes the students' lack of orientation towards the cognitive processes involved in writing: planning, textualization and revision (FLOWER and HAYES, 1981). Another element that entails great difficulty is the lack of an evaluative instrument to guide the students' writing processes and determine the demand of the task. Also the importance of having a formalized formative system to mediate the research and writing process of the TFG.

Regarding didactic resources to accompany the genre, a set of resources was elaborated based on the characteristics of the genre, its functions and the stated needs of teachers and students in the community approach stage. This information made it possible to generate learning resources that support students in the development of academic writing in aspects related to writing as a process, with the rhetorical organization of the genre and its lexical grammatical elements, the management of intertextuality and aspects related to the linguistic construction of the genre (cohesion/coherence, paragraph construction and use of academic verbs).

Our accompaniment proposal is based on the strategy of making students aware of the importance of the discursive genre as a means to access and construct knowledge within the framework of academic-professional training. Therefore, in each of these resources, a scaffolding is suggested so that students take control of their learning processes. This allows us to generate a writing model of the discursive genre for the discipline concerned that considers the needs of the students and a progressive increase in their rhetorical and generic knowledge. Likewise, another of the projections would be to approach orality with the purpose of designing didactic resources to accompany the

students' needs students in the development of academic oral communication skills (MANOSSO and SCOS, 2021).

As possible limitations of this collaborative and applied work, it is necessary a greater integration in the process of accompanying engineering thesis guide teachers, in order to promote a more situated and contextualized learning with the disciplinary task and connected with the writing challenges presented by each of the cycles of the curriculum.

In this sense, by way of projections, the applied research developed allows us to move towards a design of instructional materials that promotes the development of academic writing of the main genres in the field of engineering, as well as to evaluate the impact of the learning resources designed in the development of the writing of the Title Paper genre. (GEVEHR, FETTER, KARPINSKI, 2019).

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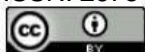
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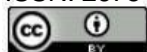
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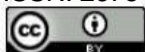
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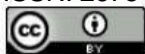
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