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The Experience of a Brazilian Graduate Student in the United States in Disciplinary Writing: The Cognitive, Social, and Rhetorical Influences on a Thesis Introduction

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THE EXPERIENCE OF A BRAZILIAN GRADUATE STUDENT IN THE UNITED
STATES IN DISCIPLINARY WRITING: THE COGNITIVE, SOCIAL, AND
RHETORICAL INFLUENCES ON A THESIS INTRODUCTION

being

A Thesis Presented to the Graduate Faculty
of the Fort Hays State University in
Partial Fulfillment of the Requirements for
the Degree of Master of Arts

by

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GRADUATE COMMITTEE APPROVAL

The graduate committee of Gilberto Pereira approves this thesis as meeting the partial fulfillment of the requirements for the Degree of Master of Arts.

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ABSTRACT

Eighty percent of the international students in the US are pursuing their post-graduate degrees (Institute of International Education, 2017) and studies show that the introduction of the thesis or dissertation is the most challenging section for this population to compose. However, most of these studies are based on textual analysis and overlooks the social factor and cognitive processes underlying the composition of this intricate section. Another gap in the literature is the lack of attention to how Latin-Americans develop their writing in master's programs, especially to Brazilian students, the ninth largest international student population in the US. Therefore, this study aims at narrating and investigating the cognitive processes and social factors that influence the rhetorical choices of a Brazilian graduate student in a US university. A ten-month case study was conducted, and data were collected through ethnographic and discourse-based interviews and analyzed on the basis of the Cognitive Process Theory of Writing (Flower and Hayes, 1981), Sociocultural Cognitive Theory (Bazerman, 2009), and CARS (Creating of a Research Space) model (Swales, 2011). Results suggest that international students' home literacy experiences are transferred to the US context and, as Bazerman suggests, their cognition is transformed through the interaction with the research community. This study also confirms that reviewing the literature is the most challenging rhetorical move because of the limited rhetorical awareness developed in both Brazil and US universities.

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INTRODUCTION

The number of graduate students in the USA increased by 58% between 2007 and 2017 (Institute of International Education, 2017). International master's students have a huge challenge to surmount in an English-speaking country: writing their thesis, a requirement in most programs. A thesis can be challenging for both NES (Native English Speakers) and NNES (Non-Native English Speakers) who had little research experience in their undergraduate programs (Chien, 2015; Gao, 2012). However, international students perceive more specific difficulties in their academic studies than native English-speaking students since "pursuing a degree in a second language environment can be a challenge, particularly during students' first year." (Berman & Cheng, 2010, p.37). The ability to write is critical for the career development of the graduate student (Odena & Burger, 2015), and, for a master's student, the completion of the thesis means not only to meet the requirement of the program but also to increase the chances of entering a Ph.D. program, which considers the candidate research experience (Odena & Burger, 2015; Lillis & Curry, 2010; Motta-Ruth, 2012; Chien, 2015). Several studies on graduate writing have been done with students from Asia (Bitchener & Basturkmen, 2006; Cheng, 2007; Gao, 2012; Bitchener & Basturkmen, 2006; Cho, 2004; Odena & Burgess, 2017; Silva, 1992), Africa (Silva, 1992), and Europe (Cho, 2004; Muller, Gregoric, & Rowland, 2017; Berman & Cheng, 2010; Odena & Burgess, 2017; Bitchener & Basturkmen, 2006; Nimehchisalem, Tarvirdizadeh, Paidary, & Hussin, 2016; Silva, 1992). Although James (1984) and Silva (1992) include Brazilian students, their studies are limited to sentence level issues and do not consider the social and other metacognitive aspects of their writing. Ferreira (2012) conducted a case study of a Brazilian at a public university in

Brazil, but also mainly focused on the rhetorical aspects of writing and disregarded further social variables that impacted the writing. No other qualitative studies on Brazilian graduate student in English-speaking countries have been done in the past 26 years.

Academic writing must be challenging for a Brazilian graduate student in the US since academic writing is not always explicitly taught in Brazilian universities. Among 68 public universities in Brazil, only 21 presented from 1 to 3 writing initiatives, such as writing centers or writing courses (Bork, Bazerman, Correa, & Cristovão, 2015). Because Brazil is among the top 10 countries that sent more international students to the USA (Institute of International Education, 2017) and little is known how academic writing is taught in Brazilian universities, more studies are necessary to understand how this growing number of students adjust to the writing challenges in American universities. Besides the shortage in the literature, this study was also motivated by the fact that I am master's student in the United States who faced (and still faces) many challenges in writing in disciplinary context. Why is this sentence highlighted?

Therefore, this study investigates how a first-year Brazilian master's student, whose pseudonym is henceforth Laura, learns the linguistic and rhetorical conventions of her discourse communities, primarily considering what experience and perception of academic literacy are brought from her home country to the US institution. It also aims at understanding how the student manages the social aspects (such as the advisor feedback, writing courses instructions) and cognitive aspects (e.g., the writing process, cognitive tools) of writing in a foreign language in an English-speaking country. The research questions guiding this study are as follows:

1. What are the cognitive processes involved in the disciplinary rhetorical genre development of a Latin American graduate student at a university in the United States?
2. What are the sociocultural aspects of the disciplinary writing development of Latin American graduate student at a university in the United States?
3. How do the cognitive and social processes influence the rhetorical decisions a Latin graduate student makes when writing the introduction to a thesis?

To address these questions, as described in the method section, I conducted interviews with ethnographic and discourse-based approaches and analyzed the drafts of the introductory section and other documents related to the creation of the research space of a first-year master's student. The creation of the research space refers to the initial stage of the writing process in which researchers set the stage to introduce the scope of their study. As a reference of research space creation, this study will use the CARS model, which will be further discussed later in this study in the Analytical Framework Section. As for the frame of this paper, this study starts by introducing background information on Laura, the subject of this study. The following section details the methods used for data collection. Then, a review of the literature is presented, introducing the finding on the cognitive, social, and rhetorical aspects of the disciplinary writing of graduate students who wrote their thesis or dissertation in English. Next, I explain the three writing theories that this study draws upon. The Cognitive Process Theory of writing (Flower and Hayes, 1981) is used to track the writing process mechanisms an international student goes through to accommodate the linguistic demands of the

disciplinary writing in a foreign language. CARS (Creating a Research Space) model from Swales (2011) is used to label the rhetorical moves of an introduction in a highly contextual-dependent writing activity. Sociocultural Cognitive Theory (Bazerman, 2009) is used to how the social factors from the disciplinary writing, such as advisor, writing professor, and other peers, shape an international student's cognition and, consequently, reflect on the rhetorical moves of an introduction. The result section is also displayed in three different aspects; first, I emphasize Laura's cognitive processes during ten months of composing process of the introduction section of the thesis; second, I display the social and environment factors and discuss their implications in the cognitive processes; finally, I analyze the rhetorical moves in the introduction, discussing how the social factors induce the rhetorical choices. Although the result and discussion sections bring the three factors separately, they are intrinsically interrelated. Because this study aims at describing not only how Laura writes the introduction but also what challenges are faced by an international graduate student in an English-speaking country, the final section explores pedagogical implications on how to develop genre awareness in disciplinary writing for international graduate students.

Participant background information

Laura is a Brazilian master's student working in her master's degree at a medium-size university (from 10 to 20 thousand students) in the Midwestern United States. She is between 20 and 25 years old and earned her bachelor's degree in biology in a large university in Brazil (from 80 to 100 thousand students). Laura studied English for nine years and, according to the TOEFL iBT, her level of proficiency is B1. TOEFL uses the Common European Framework to define the abilities of a speaker who is placed in B1:

Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options (Common European Framework, n.d.).

She had also been an English instructor for two years at a private language school in Brazil. In Brazil, it is common that students with some proficiency teach foreign languages even if their major is not related to teaching.

Participant's academic literacy in Brazil

During her undergraduate program, she was involved with a research project led by her advisor. Although Laura never took any writing courses, she gained her academic literacy through practices “in context” in courses and involvement with research projects (Odena & Burgess, 2017, p. 573). Despite her professional training, she had never published a research article neither in Portuguese nor English. During her undergraduate program, she read many articles, which served as the basis for her research proposal she had to write to run for master's program in Brazil. Most Brazilian universities require a 10-20-page research project as part of the selection process. She applied for a master's program at a Brazilian university and at the current US university, but she opted for the latter because of the possibilities of pursuing her Ph.D. in the USA and for the opportunity of the practice of improving her English skills. Laura's boyfriend is also

studying in the USA and helped her occasionally in her thesis. Laura enrolled in a writing course, which is part of her degree requirement. She started creating her research space already in her first semester as a paper of a mandatory writing course specific for Biology researchers. I closely accompanied the ten-month process of the creation of the research space for her thesis, which culminated in the introduction section. The ten-month period was important because it allowed for the collection of enough data to track Laura's cognitive development while creating the research space by interacting with the research community in the US and generating drafts for the introduction. The result section thoroughly unravels Laura's past and present experience in academic literacy in both Brazilian and US disciplinary contexts.

METHOD

Participant selection

As the subject of this study, I selected the participants based on following criteria: (a) the participants must be a Brazilian graduate student; (b) they must have completed their undergraduate program in Brazil; (c) they must be writing their thesis. Using the snowball method, I contacted students on campus asking them to forward my recruitment email to individuals who met the three criteria. Only one student who replied to my recruitment email met the criteria. Although a sole participant may appear restrictive to generalize any findings, I had the opportunity to conduct an in-depth investigation, including more variables in the studies than other case studies that involve a higher number of participants. The participant signed an informed consent form as part of the Human Subjects' Research Review at my university. Accordingly, the participant was

given the pseudonym “Laura,” and any identifiers are hidden in the writing samples collected.

Research design

This research is based on a case study of graduate students in the US. Using IRB-approved approaches, I designed the ethnographic and discourse-based interviews to understand the cognitive and social variables that permeated ten months of writing a thesis and reflect on her rhetorical choices in the introductory section. Although a case study based on an individual may be perceived as limited to generalize findings, it is an effective method for this study because it aims at an in-depth analysis of the interplay of the social and cognitive factors in writing, are likely to be overlooked in a study involving more than one student. Why is this highlighted?

Ethnographic questions are used to track Laura’s cognitive processes and elucidate the social factors that drove her writing process, including advisorship and writing beliefs she builds upon disciplinary writing in Brazil and in the US. Discourse-based interviews were used to clarify her rhetorical choices at the sentence level (word choice, transition, and textural citation style) and at the text level (rhetorical moves in the introduction) This approach proves suitable for the object of this study because, whereas the ethnographic interviews reveal the influence of social factors (such as advisor feedback and writing courses professor instruction) in the writing process, the discourse-based interviews allow to understand how these factors interplay with the rhetorical choices made in each draft. Both ethnographic and discourse-based interviews allow for an investigation that, going beyond textual analysis, dives into the complex realm of writing in the disciplines as a sociocultural cognitive activity.

The choice to separate the social and cognitive aspects of development present advantages that compensate for its limitation. Separating these aspects may lead to a distortion of the data since, most of the times, it is not realistic to separate the writer's cognition from the social environment, especially in the context of international students, who are more likely to seek help in the writing process than domestic students. Besides, it may seem unrealistic to separate the social and cognitive factor in graduate programs, in which there is an intense interaction among student, advisor, and committee board in the writing process. Despite all these limitations, separating the cognitive and social aspects also present advantages. The separation mitigates the complexity of the of the writing process of a highly-demanding context and allows for a clearer understanding of whether and how the social interaction drives the cognitive decisions made in the process. In other words, this separation allows spotting more precisely in what ways the advisor, professors, writing center consultants and any other sorts of social interaction interfere in the process. Putting the social and cognitive aspects apart is not intended to perpetuate the well-known dichotomy in the literature between cognition versus social interaction. It is rather intended to more specifically relate extralinguistic factors to the rhetorical decisions made in an intricate and highly context-dependent of writing in a disciplinary field. Same comment

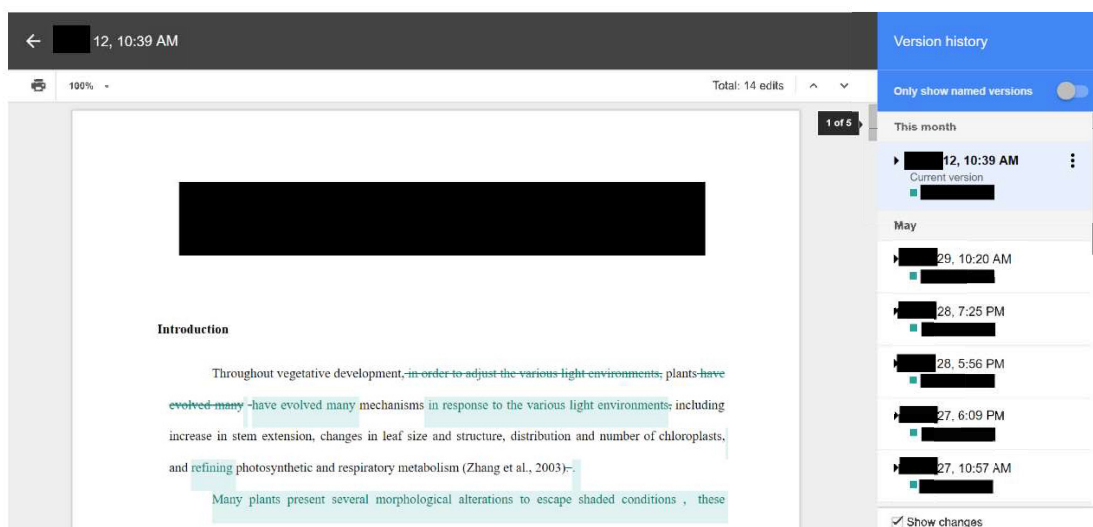
Data collection method

I conducted semi-structured interviews and collected documents related to the writing process. The semi-structured interview approach proved to be suitable for a case study because it allows the participants to more freely reflect and narrate their own story and, at the same time, generate comparable qualitative data to other case studies. The

interviewee showed a preference to speak in Portuguese, the Brazilian official language because the conversation in L1 appeared to be more fluid and dynamic, and nuances, such as emotions and attitudes, were more easily spotted in her native language than in English. A set of open-ended questions were asked (see Appendix B for interview questions). Predetermined questions were asked, but the interviewee was not interrupted. In-depth questions were also asked to clarify the information provided. In addition to other documents involved in the writing process, such as notepad or drafts, I asked Laura the permission to access the file in which she had been writing the thesis. Because she revealed using Google Docs, I asked her for a Google Doc link, an online text editor that allowed me to closely accompany her writing process and helped me develop both ethnographic and discourse-based questions. Google Docs befits the purpose of tracking her writing process because, as shown in Fig. 1, the application saves each draft of the introduction and highlight or strikethrough every modification made in each draft.

Fig. 1

Screenshot of Laura's Google Docs version history of the introduction



During the interview, the participant revealed other documents related to her thesis production, such as notes, posters, and research proposal written in other disciplines. These documents were part of the thesis introduction writing process and were collected with Laura's permission. I conducted four interviews that lasted four hours in total; all the interviews were recorded and stored in a secure location. After each recording, the conversation was transcribed, reread. Later, the documents provided were analyzed, coded, and issues to be further pursued were noted and queried in the next interviews.

Interviews included questions regarding the social and cognitive aspects encountered during the ten-month period when Laura created her research space, which started with the selection of the topic and finished with the full-fledged draft of the introductory section of the thesis.

The choice for the introductory section

The introduction is salient for my analysis because it is the section of a genre that reveals intense social and cognitive activities, which are reflected in the complex, sophisticated rhetorical moves made to create a research space. The complexity comes from the fact that the introduction represents the first set of rhetorical moves of a master's thesis to convince the research community of the validity of the research. Hyland (2004) suggests that some of the expectations in an introduction are to "establish novelty," "make a suitable level of claim," "acknowledge prior work and situate claim in a disciplinary context," "offer warrants for one's view based on community specific arguments and procedure," and "demonstrate a disciplinary ethos and willingness to negotiate with peers" (p. 12). To properly execute these moves, Hyland posits that writers

have to be able “to anticipate the possible negative reaction” (p.13) of their audience. Besides, these moves are not meant to be exhaustive because, as Bazerman (2009) explains, each field has a view of the world that translates into a different rhetorical discourse. Therefore, the rhetorical moves of an introduction may vary according to the genre from a specific field because they meet expectations not only from the genre itself but from “the complex of persons, objects, events, and relations which generate rhetorical discourse located in reality.” (Bitzer, 1968, p.11). In addition to the linguistic and rhetorical expectations, in the context of graduate programs, social interactions influence the student’s cognition since the advisor normally provide feedback in the writing process and the committee may request modifications at the end of this process that may alter the introductory section. Besides the research community, as shown in the literature review, it is usual that the international graduate students seek assistance from writing centers and native speakers to review their writing.

This study, therefore, focuses on the introduction of the thesis because, as shown above, this section is the result of intense cognitive processes and social interaction for a first-year international graduate student. Therefore, besides the usual textual analysis, which is the most common method used in other studies of introductions written by graduate non-native graduate students, I also deem necessary to verify how the social and cognitive factors influence the rhetorical decision.

LITERATURE REVIEW

Studies have been done on international graduate student perception on the process of writing their thesis or dissertation in English. Most of them investigate students who are pursuing their degree in an English-speaking country and, unlike in their

home country institutions, they have no choice other than English to write their final papers. Although each study emphasizes on one aspect of their writing (cognitive, social, or rhetorical), they also present minor results pertaining to two aspects, which were relocated to another subsection of this literature review. The first subsection focuses on the findings of the writing process and sentence-level issues international students face when writing their final paper. Next, the sociocultural factors, such as the relationship with the advisor and writing center consultations, receive the emphasis. Finally, rhetorical and genres issue findings are arrayed.

Process and sentence-level issues

Process and sentence-level issues are in the same subsection because international graduate students often reported that sentence-level issues directly interfered in the writing process, especially in the translate and review stage. These are recurrent issues in the writing of international students, especially those who perceive that good writing relies on grammar and vocabulary domains. The studies below suggest that most non-native graduate students believe that meaning is created on the level of the sentence and, as a consequence, a sizable portion of their writing process is spent on reviewing word-choice and grammar accuracy.

International graduate students have issues at the sentence level when writing their thesis or dissertation. Article, verb, and preposition usage, as well as punctuation, are recurring concerns for students whose language syntax and preposition usage differ from English's (Muller, Gregoric, & Rowland, 2017; Silva, 1992). Gao (2012) showed that linguistic differences in the usage of prepositions and tense mood in English are challenging for Chinese graduate students. Furthermore, Chien (2015) reveals that the

lack of vocabulary restrained L2 writers to move on to the level of discourse organization of research articles. Silva (1992) also contends that advisors perceive that the limitation in vocabulary makes L2 writers unable to “express their ideas, feeling, and perceptions accurately and precisely” and also to “manipulate lexical nuance and connotation” (p. 28). In the same study, a Brazilian student identified difficulties using phrasal verbs and pointed out the preference to use “verbs originated from Latin, which contain identical nuclei Portuguese and, as a result, the most peculiar ones are selected” (p. 38). L1 interference made graduate students perceive their writing in L2 as less sophisticated because of the repetition of word and the lack of coordinate and subordination of short sentences. They also perceived their writing in L2 as less expressive of their thought and intentions.

A Brazilian doctoral student, subject of the James (1984)’s case study, also presented difficulties at the sentence level that prevented the readability of the writing. The inefficient ordering of propositions, the inappropriate weighting of propositions and the functional incoherence blurred intended meaning; overlong complex sentences, faulty referencing, and lexical difficulties were perceived as distractions for the reader. Dong (1998)’s study on 169 graduate students in 2 large universities in the US reinforced that master and doctoral students face similar challenges at the sentence level. About 49% of the participants designated their weak point as grammar and mechanics, and 30% were more likely to indicate problems with vocabulary. All of them indicated vocabulary as the most important area in writing research articles. Transition, word order, and subordinate sentences are also issues faced by a significant part of the students. Bitchener and

Basturkmen (2010) reported that advisors in New Zealand had to provide feedback on accuracy and appropriateness more than any other areas, such as rhetoric and genre.

Besides vocabulary, L2 writers had difficulties expressing the relationship between ideas. Bitchener & Basturkmen (2006) compared student and advisor perceptions on graduate student writing. The study showed that students perceive their proficiency in English as the “major stumbling block to write well” (p. 11). Whereas graduate students believed that their writing constraints were located at the sentence-level, advisors revealed that their issues were on “expressing and linking ideas” (p. 14). In other words, “students tended to see their problem more at the sentence level, whereas the advisors saw it more in terms of creating clear meaning at the paragraph level and in terms of understanding the rhetorical and organizational requirements of the genre.” (p.13). The perception L2 graduate students have of their writing impact their writing process; for instance, if grammar and vocabulary accuracy are dear to the writer, this perception may delay the translate stage, whereas L2 writers who do not focus on grammatical and lexical accuracy may go through the planning stage more quickly. This study case aims at investigating whether or not the sentence-level issues hinder the translate stage of Brazilian writers of English, especially because Brazilian Portuguese and English present many false cognate words and diverge in preposition and article usage.

L2 graduate students have a writing process that differs from L1 writers because of the bigger gap in language. Silva (1992) observed that concerns with grammar and limitation of vocabulary slowed down the writing pace of Chinese graduate students and impeded their ability to write fluently in English. The review stage was time consuming

because most students reported spending a great deal of time eliminating repetition of ideas, and correcting spelling and grammar. Conversely, a Japanese student found that revising in English was easier because he had had more formal instructions in English than in his first language. A French student was honest by reporting, “I just translate from French to English, and I care much about choosing the right words and appropriate expressions.”

The writing process for international graduate students also involves personal metacognitive strategies. Odena & Burgess (2017) describe the experience of 30 doctoral students in the UK, Canada, and Australia and reveals that they developed personal organization skills to cope with their demanding thesis writing process. Odena & Burgess report that most students had “admirable” time management between other courses and personal life. To increase productivity, they had break periods between writing slots, which varied from people to people; however, “making the most out of the period of high productivity could drive participants to the point of exhaustion” (p. 582). Participants showed a high level of resilience and motivation because of the emotion engagement with their chosen topic. Odena & Burgess find out that, for ESL graduate students, “the process of writing and reviewing their work to improve both content and style was sometimes a difficult and arduous one” because it demanded “the ability to tell and retell pieces of information in the form of narratives and description” (p. 583), which represents a metacognitive strategy most students do not learn in ESL classes. To acquire the lexicon usually used in the disciplinary writing, students kept a notebook to gather new words and phrases in English to be used in their own paper. Google and dictionary searches, as well as native speaker consultation, helped them find the difference in the

nuance of the meaning of words. Specifically, about the decision of when to compose the introductory section, Dong (1998) finds out that some graduate students work on it either after or at the same time as the other sections. Most of them used their native language when planning their writing and not sure about the vocabulary, and some students had their thesis/dissertation sections drafted by their instructor because of a knowledge problem and experience problem.

Gao (2012) found that Chinese students writing process were constrained not by the convention of the English language but by their familiarity with the disciplinary contents and general composing skills. Results suggested that the lack of critical thinking in Asian students' English writing was not due to cultural conventions but the extent of content familiarity. The study also indicates that mastering the rhetorical aspects of academic writing does not guarantee the student will succeed in their writing if they do not have metacognitive strategies to collect, organize, and analyze information for their final graduate paper. The writing process seems to be related to the conception of academic writing graduate students and their advisor have. Thus, the sociocultural factors play a big role in the writing process since the advisor's role in a graduate program is, among other tasks, to provide feedback on the thesis. Laura's case study may reveal cognitive strategies an international student develops when under pressure to write in a highly disciplinary context and, therefore contribute to this literature.

Sociocultural factors

Even though sociocultural and cognitive factors are reported separately, it is tempting to draw an interplay between them since international graduate students pursuing their degree in an English-speaking country tend to rely on collaboration to

write their final paper. Relationship with the advisor and learning through immersion are the most oft-cited factors when writing a thesis or dissertation in an English-speaking country. All participants in Cho (2004)'s study reported learning their discourse community by interacting with colleagues and professors, submitting for publication, and communicating with journal editors. All non-native speakers (NNS) sought assistance from native speakers (NS) either to co-author or to be actively involved in the research. Graduate students deemed the role of the professor critical with respect to supporting and guiding their student's research.

Graduate students may develop the academic literacy in English regardless of the country. Cho (2004) found that, although graduate students immersed in a native-speaking country benefitted from more straightforward access to both linguistic and mainstream knowledge of academic writing, graduate students can also become academically literate in English in non-English speaking countries. Li (2007) studied the case of a graduate student developing his English academic literacy in his own country and highlighted that the key factor for his success was his commitment and engagement with the local research community, the laboratory data, his own experience/practice of writing research articles, and the global specialist research community. His engagement with the global specialist research community is an important aspect to be developed by any graduate student regardless of the country of the program.

Doctoral students in Odena & Burgess (2017)'s study revealed how advisors provide feedback and reveal that some students and advisor preferred written feedback, while oral. Both types were considered necessary at different points of the thesis process. Some advisors had strict deadlines, which were appreciated by most of the students

because they felt more organized in the writing process, and often their feedback was perceived as motivating to complete the task. Odena & Burgess cite Smith (2009) to classify the role of the advisor: (a) nurturing, use of facilitative coaching, (b) top down, with more structure and formality; (c) 'Near peers', characterized by role modeling and close affiliation with advisor; and 'Platonic', with little guidance on research ideas beyond exhortation to keep working and to bring back issues for discussion. Odena & Burgess asserts there was no unanimity among the 30 doctoral students interviewed since each of them reported a different sort of relationship with their advisor.

Dong (1998)'s interview and questionnaire show that 60% were involved in collaborative team work to write their thesis or dissertation. About 44% had no assistance during thesis/dissertation writing and felt isolated in the process, and 50% had assistance only from their advisors. In identifying outside help, they tended to rely on their fellow country student for help, and very few received any help from native English speakers other than their advisors or the Writing center in the English department.

Bitchener, Basturkmen and East (2010) investigated what supervisors and students considered to be effective feedback, and written feedback was encouraging for students to become autonomous writers and reach the academic performance expected in the research community, but the face-to-face feedback was also considered important to build a dialogic relationship between students and advisors. The study also found that L2 students needed greater guidance to discuss the published literature and their own research findings. Advisors often reported having to provide feedback to both L1 and L2 advisees on constructing arguments and presenting them in a coherent and cohesive manner.

The infrastructure of the university and previous academic literacy were other sociocultural factors that also impacted graduate students' writing. Infrastructure includes access to books and articles provided by the university (Chien, 2015; Ho, 2013), and previous academic literacy involved research experience in the students' home country (Gao, 2012). Dong (1998)'s work shows that, among 169 graduate students, 60% had previous research writing in English, and 45% had no extensive writing experience in disciplinary contexts in their native language.

Cognitive and sociocognitive factors are hardly correlated in the literature since they are hitherto regarded as discrete variables in the composing process. Contrarily, the rhetorical aspects are regularly linked to the writing process as shown in the next subsection. I intend to draw correlations between the social and cognitive as part of the composing process since the success of graduate theses tend to rely on an intense relationship with the advisor and other more experiences writers from the same disciplinary context.

Rhetorical analysis and genre

For graduate students, reviewing the literature and pointing out a gap in the literature are onerous rhetorical moves. Doctoral and master's graduate students in Taiwan had difficulties in finding an original topic for their thesis and dissertation (Chien, 2015; Yeh, 2010; Cho, 2004). Chien (2015) explains that the little experience in searching and reviewing the literature comes from the lack of experience with research in the undergraduate program and limited access to resources in the library. Chien also learns that, even with access to the sources, reading and synthesizing can be overwhelming and frustrating for novice graduate writers. Graduate students in Cho

(2004) claimed that the pressure to select a topic comes from their concern with the contribution of the study to their speech community and to the society as a whole. Cho (2004) and Ho (2013) conduct a case study with graduate students in Taiwan writing in English and an American graduate student writing in Chinese and accentuates that the target language in which the journal articles were written was also an obstacle for both Taiwanese and American graduate students to write the literature review.

The rhetorical and discourse aspects of writing are subtle and perhaps the most problematic issues for graduate student writers. Silva (1992) exhorts that the major rhetorical problems of graduate students are the lack of knowledge of the audience and lack of rhetorical repertoire when writing for an unfamiliar audience. Participants in his study perceived English as a language with challenging rhetorical organization, such as the use of the topic sentence or appropriate style/tone of academic writing in English. US academic writing is usually perceived as straightforward (Silva, 1992), and based on argumentation rather than on description or narration (Dong, 1998; Gao 2012). Formality, objectivity, concision, and precision are traits graduate students struggle to grasp when writing their dissertation (Dong, 1998). Students in Bitchener & Basturkmen (2006)'s study perceived their writing style as simple and boring, and they have difficulties gauging a voice of academic texts written by a native English speaker.

Gao (2012) shows that the voice in graduate papers in English is especially hard for Chinese graduate students, who are strongly influenced from Chinese cultural schemata of collectivism, which usually clashes with the Western culture of individualism. For instance, Chinese students reported that their advisor often crossed out the word "people" in their thesis, when referring to a group of people, and suggested to

use “individuals” instead. Gao explains that the Chinese Confucianism school of philosophy of collectivism prevails over the individualism, a trait in the American Rhetoric, and causes problems when Chinese students write in another language. In addition to the voice, graduate students who are writing in their home country also struggle to grasp the rhetorical features of academic writing in English. Taiwanese graduate students pointed out that, although most of them followed the general Introduction-Method-Results-and-Discussion (IMRD) structure (Swales, 2011), they did not have a clear idea on how each different section should be set up or organized (Ho, 2013). They lacked knowledge of the purpose of the rhetorical moves of each section. The same students also reported that writing a review of the literature was more difficult than the other sections of the paper. Nimehchisalem, Tarvirdizadeh, Paidary, and Hussin (2016) investigated 30 research article introductions of master’s students from Iran and found that half of the articles failed at reviewing items of previous research and at indicating a gap.

Graduate student and advisor perceive difficulties in the introductory section as a lack of knowledge of introduction as a section with specific rhetorical genre features. Graduate students who either study in an English-speaking country or in their home country face the challenges to perceive theses and dissertations as a genre with rhetorical moves that address a specific situation. Ho (2013) finds that writing a review of the literature was more difficult than other parts of a research paper for two reasons. First, writing a literature review section requires one to read and synthesize multiple articles, which can pose a tremendous challenge to many graduate students. Bitchener & Basturkmen (2006) comparative study found that all the supervisor felt the students

lacked a full-fledged understanding of research articles as genres with specific rhetorical expectations. Similarly, Dong (1998) reports that lack of rhetorical and genre knowledge was noted by faculty members as a problem for both NS and NNS. Most case studies so far reported international graduate students who have been unsuccessful in meeting rhetorical expectations of their speech community. Unlike these studies, Cheng (2007) reported on a focal student who was able to critically deploy three different rhetorical sets of moves in three drafts of the introduction. Through advisorship and writing courses, the graduate student was not only able to employ the generic features of an introduction but also developed a sophisticated awareness of the rhetorical moves, taking into consideration the reader and the rhetorical situation. This study also expects to find out whether writing courses have an impact on a Brazilian graduate student in the US.

The literature suggests that graduate students present difficulties ranging from more palpable aspects of writing – e.g., the grammar and vocabulary shortage - to finer characteristics - e.g., rhetorical patterns of genres in disciplinary writing. Both extremes seem to be swayed by social factors, such as advisorship and previous experience with disciplinary writing in their country. However, considering that writing is socioculturally dependent, despite the limitation studies in Latin-American graduate students, no studies have attempted to connect all these aspects to explain why students have difficulties in writing their thesis, especially the introduction, which is frequently perceived as an intricate section to master.

Studies that focus on one section of the paper limit their investigation to the textual analysis and studies that investigate the social and cognitive process tend to investigate the dissertation and thesis as a whole. Therefore, no studies have conducted

an in-depth investigation of one section of the paper, especially on the introduction that, as previously discusses, proves to be one of the most challenging for international graduate students. To address this difficulty, this study is designed to investigate the composing process of an international student as the result of intense social interactions and cognitive process. This approach seems to draw a more realistic perspective of writing in a disciplinary context and prone to provide answers to the issues reported in studies with international graduate student writing.

ANALYTICAL FRAMEWORK

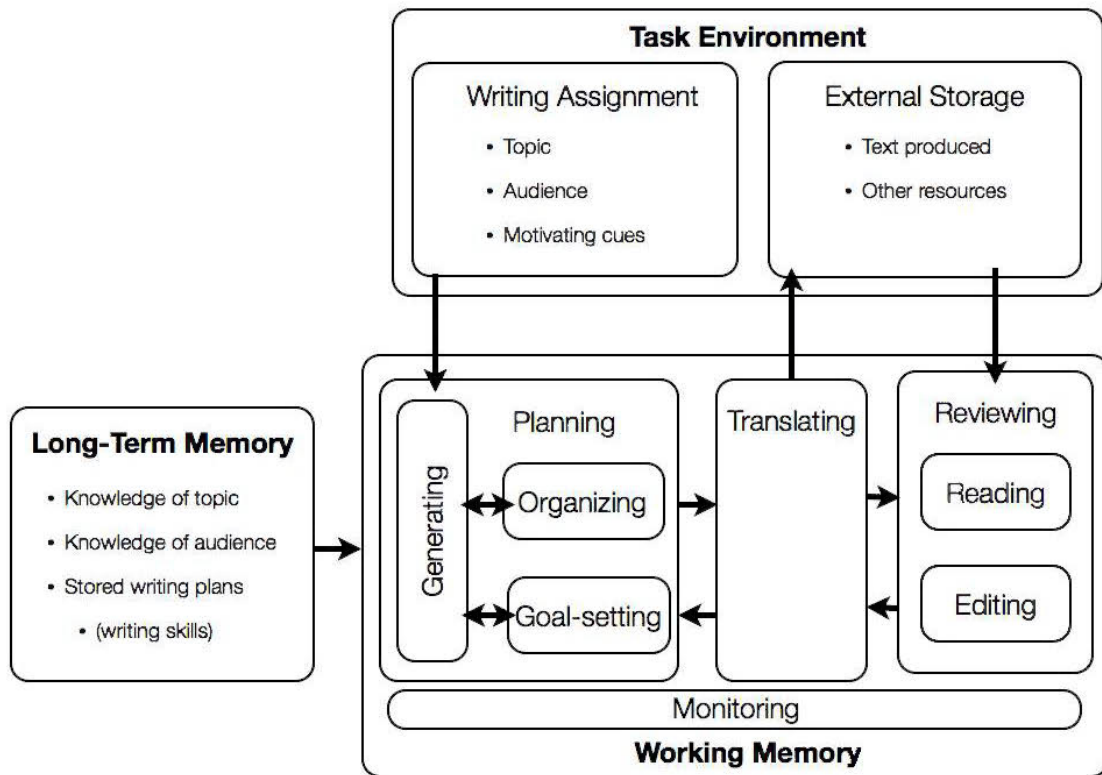
Three theoretical frameworks will guide both the method of analysis and discussion of the data collected. First, the Cognitive Process Theory of writing (Flower and Hayes, 1981) will help track the process of composition, including the metacognitive tools used in each stage and the solutions Laura found for each of the constraints that interfered in the process. The second framework is CARS (Creation of a Research Space) from Swales (2011), which will be used not as a model to be followed but as a reference to analyze the rhetorical moves in the introduction. Finally, Sociocultural Cognitive Theory (Bazerman, 2009) will be used to analyze how the social and cognitive factors drive the rhetorical choices in the introductory section.

The Cognitive Process Theory of Writing

Flower and Hayes (1981) developed a theory of the cognitive processes that traces the composing process of writers. The five-year study generated a writing protocol widely used as a reference of the stages of writing. The stages of the protocol are shown in the Fig. 2:

Fig. 2

Schemata of Cognitive Process of Writing from Flower, L., & Hayes (1981).



The cognitive theory posits that the act of writing involves three major elements: the task environment, the writer's long-term memory, and the writing processes. The **task environment** is the rhetorical situation, audience, and goal in writing. The **writers' long-term memory** is where they store their knowledge and access it during the writing process to deal with the task environment. Finally, **the writing process** is the moment when writers act toward planning, translating, and reviewing the text. Laura's environment task is the completion of her thesis, being the introduction the focus of this

study. Her long-term memory relies on the experience of writing and researching in disciplinary contexts in Brazil, and the writing processes are the stages of the ten-month process registered through interviews, drafts, and other documents related to the creation of the introduction.

Flower and Hayes define the sub-categories of the writing process. **Planning** is the abstract representation of the writer's internal knowledge and is represented by:

- a) **Generating ideas:** retrieve relevant information from the long-term memory;
- b) **Organizing:** shape ideas into a meaningful structure;
- c) **Goal-setting:** include both procedural (how to write) and substantive (what to write) goals for the process.

Translate is the stage that consists of “putting ideas into visible language” and it “requires the writer to juggle all the special demands of written English.” (Flower & Hayes, p. 373). This study, nevertheless, uses the term “planning” for any written or cognitive thought before the “translate” stage, which refers to any attempt to write the text into the conventions of a genre. In the context of this study, translate does not refer to the common sense meaning of transposing one national language to another. It strictly refers to the effort to code the text into a textual form according to the written demands of the English language, such as spelling, transition, sentence, and paragraph formation. **Reviewing**, as shown in Chart 1, relies on the sub-processes: evaluating (a planned review) and revising (an unconscious review). Finally, **Monitor** is the stage when the writer decides to move from one stage to the other, e.g., from planning to translate.

Laura's cognitive processes will be mapped out according to protocol codes from the Cognitive Process Theory from Flowers and Hayes (planning, reviewing, etc.). Although Chart 1 shows a protocol rather prescriptive, this study does not expect Laura to follow all the stages in the order presented in the figure. The codes are used to align with the traditions in writing studies and facilitate comprehension, easing the burden for the reader to learn new codes. The Cognitive Process Theory of Writing has helped clarify the complexity of writing, but it does not speak to the social factors that are intrinsic in the writing of a graduate student, who is more prone to have her writing dissected by advisors, instructors, and writing center consultants for not being a native English-speaker. More importantly, the Cognitive Process Theory of Writing disregards the view of writing as a product of cultural interaction, which can result in viewing international students as cognitively underdeveloped if they are foreign and aware of the writing culture of the US institution or even if they choose not to comply with the standards because of their personal beliefs and identity. Therefore, to complement and deepen the analysis of Laura's writing process, this study considers Laura's writing experience as a transition from two distinct cultures of writing in the disciplines and, therefore, a sociocultural cognitive theory is deemed necessary.

Sociocultural Cognitive Theory

Although the Cognitive Process Theory reveals interesting facts of the cognitive processes, it does not emphasize how social interaction influence the cognition of an international student leading to oversimplified conclusions and myths on their struggles when writing in English. Some genre theories based on Systemic Functional Linguistics frameworks, such as ESP (English for Specific Purposes) and EAP (English for

Academic Purposes), emphasize texts as a product of social interaction overlooking the cognitive processes that underlie the writing. Also, these approaches tend to assume that genres are more stable textual typification than they are in practice. Therefore, this study draws on Bazerman's (2009) Sociocultural Cognitive Theory (SCCT), a framework that handles both the dynamic aspect of genres and the interactional aspects Vygotsky's sociocultural theory, to explain how international graduate students learn and develop their writing in an academic disciplinary context.

First, SCCT posits that each writing process is an individual path because "specific situations and associated genres would influence planning, structuring, reviewing, and audience accommodation, so that the perception of a situation and a genre might affect them all" (Bazerman, 2009, p. 282). Thus, the stages of the writing process will vary not only according to the writers' personal characteristics but also to the genre, situation, and social activity in which they are involved.

Second, SCCT does not reduce academic disciplinary genres to a template to be followed but approaches them "as rhetorical and social actions developing within particular social and cultural contexts" (Devitt, 2009). Genres are the product of social interaction built historically (Bakhtin, 1986), especially in disciplinary writing. As Bazerman explains, in the disciplinary context of academic genres, each field of studies has their view of the world and has different patterns of interaction through written language that translate into discourse patterns that result in the emergence of a new genre. At first, novice students may feel overwhelmed when entering in an academic discourse community, but when these students read, write, research, and interact with other members of the communities (Bazerman, 2009, p. 283), their cognition changes when

they start internalizing the discourse patterns. However, their cognition does not change through sheer modeling and repetition of conventions, but by participating in the community and integrating the meanings of the convention into their own discourse. At this point, a new member of discourse community can use genre not as a reference of “right way to write,” but as “sociocultural cognitive tools” to be active in the community (Bazerman, 2009, p. 290). When genres are used as tools, “writing helps them reorganize their thoughts and reintegrate their knowledge into a more comprehensive picture.” (Bazerman, 2009, p. 290). As shown in the excerpt below, Bazerman employs Vygotsky’s sociocultural theory to a conception of writing that goes beyond writing to learn:

The ZPD [Zone of Proximal Development] occurs in the collaborative participation of typified activities and discursive forms familiar to the instructor, adult or more skilled peer, but at which the learner is not yet adept. No doubt that interaction with peers or others may lead to spontaneous learning and formulation, but it appears that Vygotsky had in mind these more structured interactions built around discursive activities familiar to one of the participants. In this ZPD the learner becomes familiar with the orientations, language, and practices in the domain, which at some point become familiar enough and internalized enough that they can be integrated into perception, thought, and activity, as well as the reformulation of capacities already developed. This developmental process is deeply tied to creating reflective structures of understanding, perception, and action, and thus self-regulation. (Bazerman, p, 290)

The required knowledge to write a thesis introduction, therefore, is not prone to be developed only through writing courses but also through social interaction with the members of the research community of which the student is inserted. Through interaction, a master student will “add up, reorganize, and reintegrate” the learned material. Learning to write through social interaction is also known as situated learning (Wenger, 1998). The assumption that genre are sociocultural cognitive tools (Bazerman, 2009) serves as a complementary framework to Cognitive Process Theory of Writing (Flower and Hayes, 1981), which focus on the process, and to English for Specific/Academic Purpose (Swales, 2011; Hyland, 2004), which emphasizes on product. Bazerman’s sociocultural cognitive can help holistically comprehend the complexity and struggles a graduate student face in disciplinary writing, especially those who come from a distinct academic culture. This theoretical framework also has pedagogical implications, which will be latter discussed in the last section.

Is the introductory section of a thesis a genre?

Before moving to the third analytical framework, it is necessary to explore this study’s understanding of the introduction section of a thesis. To define genre, Miller (1984) posits that “a rhetorically sound definition of genre must be centered not on the substance or form of discourse but on the social action it is used to accomplish” (p. 151). In other words, a genre is not defined only by its textual content (substance) neither its organization nor linguistic conventions (form), but by the social action it performs when content and form are put together. Hence, she argues that genre is not defined by what it is but by what does. In Miller’s words, “for the students, genre serve as keys to understanding how to participate in the actions of the community” (1984, p. 165).

Drawing from Miller's social perspective of genres, an introduction by itself does not do anything without a context of a genre, which in its turn, performs a social action.

Therefore, this study considers introduction the set of rhetorical moves that serve as the support for a genre to perform a social action.

Hyland (2004) gives some clues of the social action a thesis performs when defining that academic writing is "concerned with knowledge-making...achieved by negotiating agreement colleagues" (p. 12). He also contends that "[i]n most academic genres, a writer's principal purpose will be persuasive; convincing peers to assent to a knowledge claim is a research paper" (p. 12). Therefore, the introduction is the space in the thesis where the writer establishes a dialogue with the research community by persuading the readership that the study is valid and necessary. In other words, the introduction explains how the study fits into the "big picture" of the broader literature. In short, this study does not consider the introduction a genre, but a set of rhetorical moves that are part of a genre. Therefore, it is expected that introduction will vary according to the genre and the rhetorical situation.

Swales CARS (Creating a Research Space) model

As promised earlier in the introduction, this section defines the creation of a research space. For a thesis, setting up the context in the introduction is far more complex than the cognitive processes underlying the written code. To analyze the rhetorical moves Laura employs in her introduction and locate the stage of her cognitive development she is, this study uses as a reference the oft-cited Creation of a Research Space (CARS), a model created by Swales (2011) that attempts to describe and explain the rhetorical organizational pattern of writing the introduction in a variety of disciplinary field of

studies. The model assumes that writers in disciplinary contexts follow a general rhetorical pattern to argue and persuade their readership how their study fits in a larger scope of their research community (University of Southern California, 2018).

Similar to Flower and Hayes Cognitive model, this study does not use CARS model as a paradigm of correctness but a reference of the possible moves that might or might be observed in her thesis. In other words, Laura is not expected to execute the moves identified by Swales because, firstly, her research community may approach the creation of the research space in a way that addresses specific rhetorical needs and traditions of writing. Secondly, Laura may not comply with the CARS model in case it does not reflect how introductions are set in the disciplinary contexts from her home country. Thirdly, her local US research community's expectations may not match the CARS model either. Finally, CARS model is not used as a reference of correctness because Laura is in constant cognitive development and moves in the model may not reflect her cognitive development at the moment I collect the draft or conduct the interviews; therefore, this model will be used rather help locate her cognitive developmental stage after ten months of writing process. Before entering the rhetorical moves, the next paragraph sets the context in which the model developed, departing from a descriptive model in 1980's of how scholarly article wrote the introduction section to a current prescriptive model of how scholarly articles *should* approach their introduction.

The model emerged from Swales (2011)'s descriptive study of the recurrent rhetorical moves observed in 48 research article introductions published in a variety of fields: 16 from Hard Sciences (Physics, Electronic, and Engineering), 16 from Biology/Medical Field, and 16 from Social Science. Although it was originally meant to

describe the rhetorical moves executed by writers from high-impact journal articles, this model is still used as a prospective model, especially in ESP (English for Academic Purposes) courses. Because it still influences how introductions are written, especially in non-native writing, Swales reissued the book in 2011 and, until June of 2018, it had been cited 1191 times. Although Swales (1981) identifies three moves in his first publication, one extra move was identified in the 2011 edition. The latter CARS model, including four moves, is the one taken into consideration in this study and is shown above.

MOVE ONE: Establishing the Field

- A. Showing centrality
 - i. by interest
 - ii. by importance
 - iii. by topic prominence
 - iv. by standard procedure
- B. Stating current knowledge
- C. Ascribing Key Characteristics

MOVE TWO: Summarizing Previous Research

- A. Strong Author-Orientations
- B. Weak Author-Orientations
- C. Subject Orientations

MOVE THREE: Preparing for Present Research

- A. Indicating a gap
- B. Question-raising

C. Extending a finding

MOVE FOUR: Introducing Present Research

A. Giving the Purpose

B. Describing present research

- i. by this/the present signals
- ii. by Move 3 take-up
- iii. by switching to First Person Pronoun

Move one, three, and four are seemingly more straightforward to code because Swales (2011) could find consistent rhetorical patterns. Move two, on the other hand, presented variation among the 48 articles and Swales focused on its linguistic features of the text in place of the purpose of the rhetorical moves. The linguistic features are whether move two contained textural citations or parenthetical citations and how this related to the use of passive or active voice in textual analysis. Therefore, it will be interesting to observe how Laura figures out Move 2 since it appears to be less structured and probably highly dependent on the field of the study.

RESULTS AND DISCUSSION

This section reports and discusses a process that lasted ten months, starting in the first semester of classes and finishing in the semester two out of four of the master's program. This section addresses the three initial questions for this study:

1. What are the cognitive processes involved in the disciplinary rhetorical genre development of a Latin American graduate student at a university in the United States?

2. What are the sociocultural aspects of the disciplinary writing development of Latin American graduate student at a university in the United States?
3. How do the cognitive and social processes influence the rhetorical decisions a Latin graduate student makes when writing the introduction to a thesis?

Although social and cognitive processes are intertwined, I will first present the cognitive process and then the social factors that impacted the cognitive processes. Finally, the third section brings a full-fledged discussion explicating how the rhetorical choices reflect the social and cognitive factors. In the three sections, the results are reported and discussed in chronological order for the sake of confirming whether social factor preceded, thus influenced, or not Laura's cognition and rhetorical decision.

Table 1 shows the overall findings of the connection between how the social and environmental factors generated cognitive processes that impacted rhetorical decisions in the several drafts generated while creating the research space in the introductory section. Nonetheless, it is important to note that Table 1 represents a generalization of the most prominent events and processes that emerged in this ten-month period of writing.

Table 1

Social/Environmental, cognitive factor and rhetorical moves

| Event/Time | Month 1 | Month 2 | Month 3-4 | Month 5 | Month 5 | Month 7-10 |
|---|--|--|---|--|---|--|
| Social/environmental/institutional factors | Heat in the Midwest of the US and meeting with the advisor | Writing Courses | Weather and equipment constraint s, and existing literature | End of writing course | Feedback from advisor | Access to resource s in library and writing center |
| Cognitive process | Planning stage: How plants survive in the heat | Organize: Demand to quickly synthesize information | Planning: Writing Process starts over | Planning and translate: Expansion of ideas synthesize d. | Translate and review: Suggestion of readings to expand ideas. Feedback to generate ideas. | Translate and Review: Translate and intense review |
| Rhetoric aspects of the introduction | Search for a gap in the literature | Literature review focus on a general reader. A rigid template is demanded by the professor | Search for another gap in the literature | Advisor informs the need of a literature review to address the gap in the literature | Advisor informs the need of a literature review to address the gap in the literature | Journal Articles are used as models |

1.0 Cognitive Aspects of the Writing Process of the Introductory Section

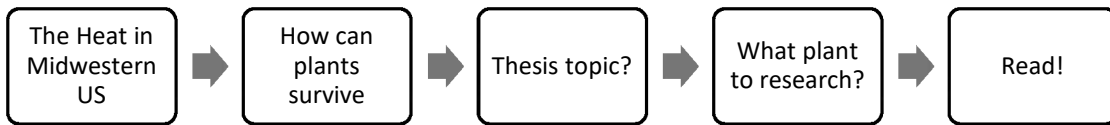
This section shows Laura's writing process stages in a chronological order to facilitate the understanding of the results and to report as close as possible to facts in the process. However, it is important to note that this process is often recursive even though the results are displayed in a linear, orderly fashion. The writing process is described into subsections according to the sequence protocol from Flower and Hayes (1981) – plan (generate, organize, and goal-setting), translate, review, and monitor, - but these stages were every so often imbedded. There were periods that she planned, translated, and revised a considerable portion of the text in the same writing cycle, and there were timeframes in which she engaged extensively to only one stage. The introductory section of Laura's thesis was divided into 2 phases: planning and translating.

1.1 The Planning Stage: Generating and Organize Ideas

The planning stage starts when Laura arrived in the Midwest of the US and wonders what mechanisms of defense are developed by plants in this region to survive in such a hot location: "When I got to the Midwest, the first thing I realized was how hot it is; the sun was boiling, and I looked at the plants and wondered how they could survive in hostile environment." The heat in the Midwest, which contrasts with the tropical weather in Brazil, seems to generate the first ideas and motivates Laura to research a possible topic for her thesis.

Chart 2

Cognitive processes that generated the first ideas for the thesis



In the planning stage, a notepad, a bullet journal, and a Google Docs file were used to generate, organize, and set the goals for the research. Laura explains that the notepad registered quick ideas: “I think of the thesis all the time; I am showering and drawing an outline for the thesis in my head, and I write them in the notepad.” Because of her “bad memory,” the notepad helps her register random ideas for the thesis that have high potential to be used in the introduction. If ideas from the notepad are deemed fit for the thesis, they are transferred to the bullet journal.

A bullet journal is a metacognitive tool used in an experiment to register the events of an experiment. Laura, nonetheless, defines it as “a little book that is used to organize the academic and personal life.” Unlike the notepad in which the ideas are all scattered, the bullet journal contained information orderly organized by date and colors, which helped her prioritize and categorize the information; red is personal financial notes, whereas information about the experiment is in green. Furthermore, Laura suggests that the bullet journal is a space where she reflects on her previous experience in research and attempts to connect them to the current thesis topic. The bullet journal helps her ponder the idea according to what she learned back in Brazil while succeeding and failing at writing and researching. A Google Docs file, which is similar to a Word document that is kept online, was used to organize the ideas giving shape and later to outline the paper.

In short, ideas are registered in a notepad, selected in a bullet journal and organized in a Google Docs.

Fig. 3

Metacognitive tools used in the planning stage

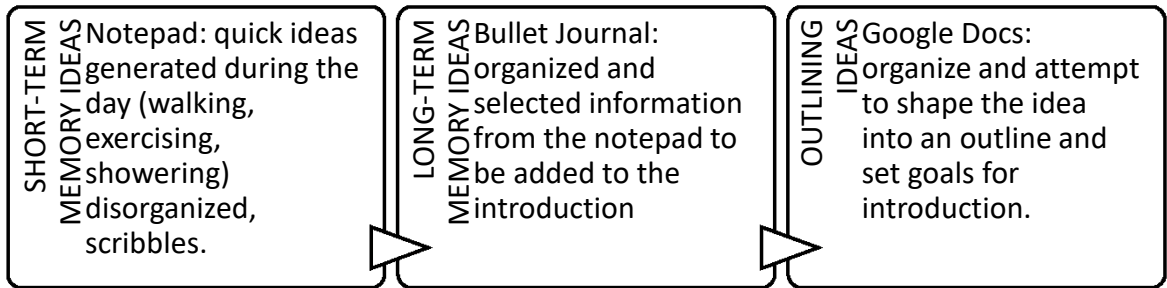
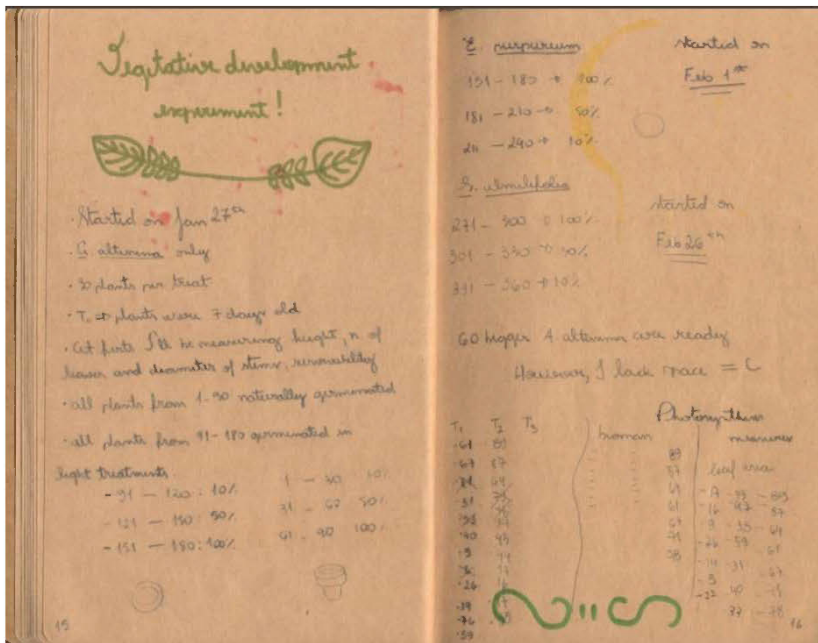


Fig. 4

The scan of a page of the bullet journal page Laura used to organize ideas

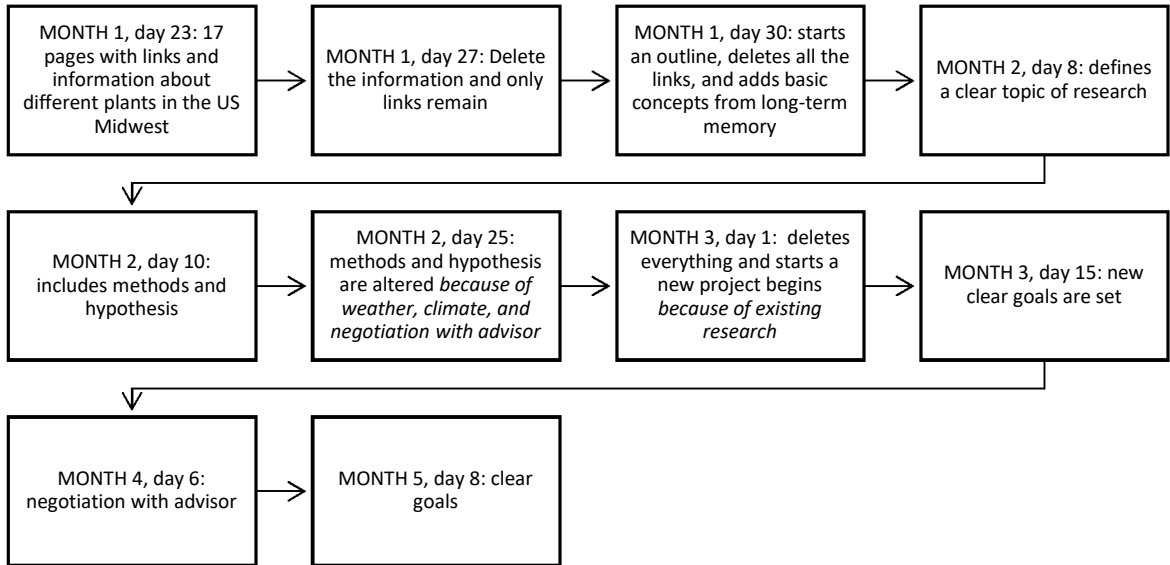


The notepad, the bullet journal, and the Google Docs captured the process of how Laura selects and faces the constraints, which are discussed in detail in section 2.0. The Google Docs file, titled as “Brainstorming for the Research Project,” shows that Laura

spent 23 days within five months of planning on the idea for projects. The most prominent revisions are shown in the flow chart below and, to protect Laura's confidentiality, the dates are referred to as MONTH X, day X:

Fig. 5

Flowchart of the planning stage of Laura's writing process from Month 1 to Month 5



The Google Doc files, along with the notepad and the bullet journal, register Laura's first attempt to select a topic for the thesis. Month 1, day 23, contains 17 pages of a variety of information about plants in the U.S, which shows that goals are still unclear. On month 1, day 27, Laura already feels the need to narrow down her thesis scope and deletes all the information and focuses on reading the links of articles about the native plants. Comments in Portuguese are observed in Month 1 and 2, indicating that Laura constantly accesses her previous knowledge and experience of research and writing in Brazil. On Month 1, day 30, the draft takes the shape of an outline of a research proposal because, enrolled in the Scientific Writing Course (SWC), Laura intends to write the final paper for this discipline, a research proposal, based on her thesis topic.

On Month 2, day 8, a topic is defined and two days later hypothesis and methods as well. However, while reflecting in her bullet journal, Laura finds the first two constraints. First, the season is not favorable for the research because there is not enough natural light for the experiment and, second, the equipment to create an environment with artificial light is not available at the university. After reflecting on a solution for both constraints, Laura schedules a meeting with the advisor, on Month 2, day 25, and sets new goals for the research: instead of investigating how plants react to light, she will investigate how plants develop in the shade. At this point, she deletes almost the entire document. Later, her advisor recommends the use of the greenhouse to conduct the experiment since no more sophisticated equipment is at hand. A new project emerges is developed.

Even after resolving constraints of equipment and weather, on Month 3, day 1, through readings, Laura finds out that her project has already been done and the writing process has to start over. As for a new idea for the project, a specie of plant that has not been researched must be found. Because of the pressure to hand in a project for the SWC (Scientific Writing Course), Laura intensively researches for new plants. Her advisor keeps suggesting non-native plants, and Laura sees no relevance in studying a plant that is not native to the Midwestern US. Finally, a new plant is found and, by Month 5, day 8, Laura starts working on the Google Docs and moves on to the next stage - translate -. Flower and Hayes (1981) defines the decision of the writer to “move on” to a next stage as the Monitor stage. In Laura’s case, the Monitor stage was influenced by a deadline of a writing course. The planning stage is mediated through her sequential use of the different

genres (notepad, bullet journal, and Google Docs). These genres were used as metacognitive tools that organize her cognitive processes in a written code.

1.2 The Translate Stage

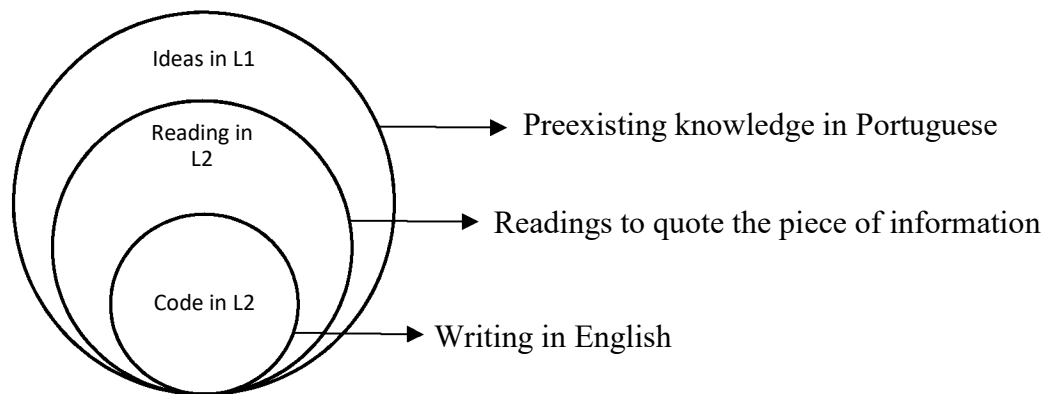
Translate is the stage in which Laura engages into a more structured draft because she has a more defined goal for the introduction and already overcome most of the social, institutional, and environmental constraints for the thesis introduction. Although the coming five months is more focused on translating, ideas keep being generated and reorganized, especially because of the readings and the feedback from her advisor. She identifies that most of the time is spent reading and little is written: “70 percent of my time looking for articles about the bibliography on my topic and very little of the time actually writing.” Interestingly, reading drives and sets the pace for the translate stage for two reasons. First, Laura reveals that she cannot write an introduction without reading what others have done. Second, as better explained in section 2.0, her advisor requires citations in every sentence in the introductory section. In other words, Laura accesses all her basic knowledge in biology to build an argument for the relevance of her study but has to cite other writers that state the same information she already knows. As a result, the literature review aims at looking for names to validate what she knows instead of finding new pieces of information related to her research topic. This requirement directly influences the rhetorical moves employed in the introduction (see section 3.0) and causes the translate stage to be lengthier than she had planned.

In a nutshell, Laura accesses all the knowledge and experience on the selected topic, which is stored in Portuguese. Through readings, she later codes them into English:

“before I started writing, I already had in my head what I wanted to write, I just wanted an article that said exactly the same thing I was trying to say.”

Fig. 6

Structure of the translate stage



Even though her advisor’s request delayed her writing process, Laura admits the readings helped her expand her ideas and refine her topic. Because she keeps generating ideas, L1 (Portuguese) is still used in the translate stage even though less frequently than the planning stage. L1 is mainly used when she needs to quickly translate her thoughts into words: “half of my text is written in Portuguese and half English; if it is something that I need to write right away because I cannot waste time with vocabulary and grammar otherwise I forget my idea.” Therefore, because Portuguese seems to be more readily available in her mind than English, she mixes L1 and L2 when she is focused on generating ideas. Laura shares that, because English is not her first language, the focus is primarily on shaping the idea and not on perfecting grammar: “I had just put ideas, key words, I was not worrying much about the text.” When a word is unknown in English, the correspondent word in Portuguese is used in early drafts and translated in the revision stage. In the translate stage, language takes a different role for Laura. While in planning

stage L1 and L2 were used to convey cognitive processes, in this stage L2 is used to convey rhetorical meaning.

Laura explains that she focuses on the idea because “good writing is the one that reflects exactly what happens in reality, without ambiguity.” It is assumed that, if “reality” is better translated temporarily in Portuguese, Laura makes use of L1 until she finds a matching idea in English in the reviewing stage. Section 2.0 explains Laura’s academic literacy experience in Brazil and in the US, which accounts for her view of academic writing and reflects on her use of a mix of L1 and L2 in the translate stage. Even when writing in English, Laura interrupts the translate stage to evaluate the meaning of words in English: “sometimes I have no better word for that idea, and I had to stick to the ones I had.” Laura’s main concern in the translate stage is to write in a way that precisely describes her thoughts, and she reveals difficulties finding a word either in her L1 or in her L2 and only weeks or months later revise the idea.

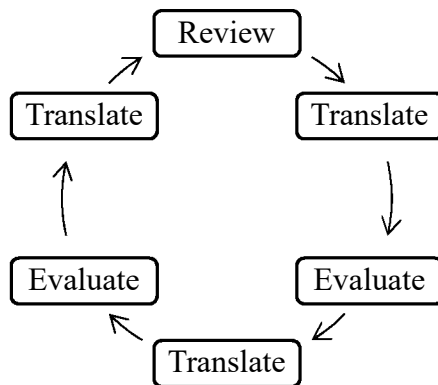
1.3 Reviewing

Translate and revision are the most intertwined stages in Laura’s writing process. Laura reveals that she does not draw a clear boundary between the revision and translate stages: “when I start writing something I do not care whether the sentence is complete, or the words are good; at first it's half done, then I give shape, then I review it a few times.” Laura identifies revision as the stage to reorganize the text in a “logical order,” “connect ideas,” and “add missing paragraphs.” Laura defines her reviewing stage as a conscious process of self-assessing and actively editing the text. Laura consciously revises her introduction at the beginning of each writing cycle, and each cycle is determined according to the time she judges she has available to write extensively: “I need a lot of

time to concentrate; I need to have the day off; I do not think I should spend so much time like this on this; wrote a lot on the winter break... and spring break.” Both translate and reviewing stages take place more intensively during the weekend and school breaks because it is when she feels more productive. Within each cycle, Laura evaluates her writing, especially in terms of vocabulary accuracy and connecting ideas. As shown in the Google Docs editing tools, Laura had 23 writing cycles represented, on average, as the illustration below reveals:

Fig. 7

Each cycle of the translate stage with revision embedded



Evaluation is a special sub-stage of reviewing when she is uncertain about the exact meaning of words. Although Laura claims not to translate word-by-word from Portuguese-English, a good deal of time is spent searching for academic words in English that correspond to a word she used in her academic texts in Portuguese. First, as recommended by a Writing center consultant, she uses a dictionary to look for the word and checks its meaning and uses a thesaurus to look for synonyms for these words. The use of these source seems to come from the fact that, because Portuguese and English have plenty of cognate words – since academic register in English borrows Latin-root words,- she has to confirm whether the share the same meaning. This process of

constantly confirming meaning indicates an attempt to transfer her academic lexicon from Portuguese to English.

I always wonder if the word I chose said exactly what I meant; then you go on the internet, often you do not know exactly if you can trust the dictionary, so we (international students) have an extra work to check if that word says exactly what we want, if that word is formal enough for you to write in your thesis.

The abundance of cognate words between the English and Portuguese academic lexicon may explain why Laura spends a good deal of time evaluating her texts. Cognates both benefit and hinder the translate and revision process of Laura. She vastly uses cognate words, but she reveals to be often in doubt whether the meaning of the words in Portuguese matches the meaning in English because similar words may be false cognates. A classic example of a false-cognate for speakers of Portuguese is the word “actually” that has as its correspondent in Portuguese the word *atualmente*, which means “as the truth of a fact” in English, but in Portuguese it means “currently.” To illustrate why cognate words can be confusing for Laura, below there is an excerpt of her introduction, and all the highlighted words have a correspondent in English and Portuguese. Because 10 out of 33 words in the excerpt are cognates, it is likely that some of them had to be looked up in a dictionary. At the end of a translating cycle, cognate words can take a good deal of time of international students whose languages share many words of science with English. Therefore, both evaluation and revision stages include dictionary consultation to constantly ratify the meaning of words in English.

Table 2

Laura's usage of cognate words between Portuguese and English

| Language | Excerpt |
|--|---|
| English (L2): | During the germination, light perception among other environmental signals such as temperature and humidity, determines where and when germination takes place (Chanyenga et al., 2012) which is an essential mechanism for seed survival. (Excerpt from the thesis introduction in English). |
| Portuguese (L1) - My translation of the excerpt. | Durante a germinação, a percepção de luz, dentre outros sinais do meio ambiente, tais como temperatura and humidade, determina onde e quando a germinação ocorre (Chanyenga et al., 2012), que é um mecanismo essencial para a sobrevivência das sementes. |

The “level of formality” is the second reason why Laura feels the need to constantly use a dictionary. The reason for the insecurity may come from the way she learned and taught English. Because the school where she studied English for five years had a pedagogy focused on developing oral English, most of her vocabulary comes from the oral register and few, from written genres. As a result, she is not sure whether the word she chooses is formal enough for a research paper in English. One last remark of this stage that Laura’s revision process is not linear and can occur at any point of the writing process: “I remember that there was a word that was ticking me off.”

As seen in this section, the writing process of an international student presents peculiarities. First, in the planning stage, the use of L1 is frequent to access the previous

in knowledge, which is stored in L1 if students took their undergraduate program in their home country. Second, the translate stage is affected by the uncertainty of whether the words are part of the formal register. Also, because Laura's L1 comes from Latin, as most of the scientific lexicon in English, she spends time confirming their meaning. Admitting her disadvantage in being a non-native speaker, Laura focuses on shaping first the idea and then coding it into a formal academic English. This strategy may benefit non-native as well as native speakers who are unfamiliar with the academic lexicon. Laura also faces issues that are challenging for both native and non-native speakers. Selecting a topic and solving issues of constraints are steps of every graduate students when researching. For these issues, Laura's prior experience in research plays an important role. Evidently, her level of English was a decisive factor for her to find support and negotiate with her advisor. These aspects are further discussed in the next section.

2.0 Sociocultural Aspects

2.1 Research and writing experience in Brazil

Sections 2.1.1, 2.1.2, 2.1.3, and 2.1.4 focus on Laura's academic literacy in Brazil. Although the focus of this study is on Laura's academic literacy in the USA, many of the rhetorical choices she makes for her thesis introduction drew on her experience of writing and research in her four-year undergraduate program through classes, interaction with peers, and advisor. It is important to note that she mentions undergraduate and graduate thesis. The undergraduate thesis is the final paper commonly required at the end bachelor's program in Brazil and is among the research experiences

she reports from subsection 2.1.1 to 2.1.4. The graduate thesis is a required part of the graduate thesis in the US and is mentioned from subsections 2.2.1 to 2.2.3.

2.1.1 Writing in the Disciplines in Brazil

Laura's current thesis writing process seems to closely reflect the way she learned writing in Brazil. Although Laura did not take any courses aimed strictly at writing in Brazil, she reveals that writing was a component frequently addressed within the disciplines, especially via research papers or research projects:

I have not had any specific courses on scientific writing, but writing was always present in the courses; there were always from two to five classes teaching scientific writing. In the first semester, I had a course that was more or less about "how to be a biologist." In this course, they talked about all levels of scientific research: first the idea, the research question, the data collection, then work the data. They also discussed a lot about concepts of positivism, the origin of the scientific method, how to carry out scientific observation, analyze the data. They taught everything about conducting research you want to publish. So, we did a small project, we had to produce an article, and I think it was the first time I had to produce an article, it was that first semester.

Her writing process comes from the writing pedagogy, "first the idea, the research question, the data collection," which indicates that ideas come from one's mind before thinking of the research question and reading the literature. She learned writing by reading articles, absorbing the lexicon, phraseology, and structure, but she believes that the professors influenced more directly the way she currently writes because her writing experience starts in the very first semester, and only later in the program she starts

reading as part of research projects. Therefore, her perception of academic writing is more strongly influenced by her professors' writing expectations although she believes reading journal articles helped her have a better sense of the real expectations of disciplinary writing:

I think I learned "how to write" and "what to write" from professors' lectures, but I think read and see exactly how it is very important. I think my writing was influenced more by professors and less by reading because I started reading just later on. I started to write (in the classroom) before reading (articles).

Laura shares that most professors collected only the final draft, which suggests that most of her professors had a product-based pedagogy of writing because they did not collect and evaluate any work done before the last draft. That explains why Laura looks for articles that serve as a model of the final product and rarely doubts how the writer got into the final draft. Indeed, and only one professor asked her for a "preview" of a paper, which signals that she was at least once exposed to a pedagogy similar to process-based. However, the term "preview" still carries a product-based connotation because it demands a series of final perfected products instead of unfinished drafts that can still be edited:

[My professor] asked us to hand in *previews* of the final project. In the first draft, it was the idea. In the second draft, it was a brief `introduction, experimental modeling, for you to write to the few. I started with a small idea and developed it little by little, but, three days before the deadline, my professor did not accept my first idea because there had been a project on it, so he wanted something innovative.

Innovation was often a requirement in research projects for classes. As Laura shares, in a research proposal for the last semester (senior year), her professor rejected her paper because it was not innovative. She then rewrote a proposal with an innovative topic of research, which was later used in an application for a master's program. However, although innovation was a crucial criterion even for undergraduate courses, her professors never required the innovative aspect to be rhetorically articulated in the research proposal. According to her, research proposals do not require proof of a gap in the literature in the introduction because it is already implicit that the project is innovative for the presentations. Instead of the gap, the rhetorical move she had to carry out in the introduction was the "justification for the project," a section of the research proposal where she justified the "real world" application and relevance for the project. Innovation seems to be an implicit expectation that refers to a gap in the literature in terms of rhetorical moves.

Feasibility was another constraint her professor evaluated in the projects and Laura tells that this criterion often limited her creativity in writing. Laura's experience in writing was attached to the "real" demands of a research process, a skill that comes in hand to solve the constraints in her thesis in the US

2.1.2 Pedagogy in the Writing Courses in Brazil

When sharing her perception of academic writing, Laura is positive that academic writing is "a description of facts in the real world" and she believes that "good scientific writing" comes from objectivity and clarity writing style. In the interview, she suggests that this perspective has been influenced by the pedagogical writing approach of her professors in her home country: "professors discussed a lot about concepts of positivism,

the origin of the scientific method, how to carry out scientific observation, analyze the data.” The writing approach varied according to the professors: “some showed the articles they have published, but others have shown the history of scientific writing.” On average, professors constantly instructed Laura “to move away from the experiment,” which seems to mean that she is not supposed to show biases in her writing style. For instance, she says that her “[Brazilian] advisor really disliked when I used the first person in my papers,” and, consequently, “one cannot write in active voice, such as ‘I collected the data,’ but rather write ‘the data has been collected.’”

Laura perceived her professor’s perspective to be strongly influenced by the US writing culture. Most of them based on the “US models” of scientific writing because they had either studied their graduate degree in US universities or published in US journal articles: “the professors in Brazil also publish in English, so they teach us academic writing in Portuguese based on models of journal articles in English.” Through reflection back in her undergraduate experience, she concludes that “they taught us the American models even though we wrote in Portuguese” but, still according to her, there was questioning its efficacy for the Brazilian context of research. The “models” were constantly reinforced in writing assignments, and they “were very strict,” and few professors allowed them to write freely.

Concerning the introductory section, she reports having a general conception of its purpose in a research article because professors superficially discussed that introduction is used to “conceptualize and show the readers what has already been done in this respect, show them the reasons for your question.”

2.1.3 Advisor and Writing in Brazil

Laura's first experience with writing outside the classroom in Brazil starts when involved as a research assistant of a scientific initiation program led by her Brazilian advisor. Scientific initiation is a program present in public universities and fomented by CAPES, a Brazilian governmental agency, and it is defined as:

... program focused on graduation students, putting them in close contact with [experienced] researchers and their research lines, aiming at fostering learning and development of more advanced concepts and methods in relation to those usually seen in regular graduation courses, including current research topics.

(Universidade de São Paulo, 2018)

Scientific initiation is an opportunity for undergraduate student with no research experience to be involved with research. Because it usually compensates the student with a small scholarship, the program requires a monthly report. Even though it is the research assistant's responsibility to write monthly reports, her advisor would not let her do it: "I wondered when I would learn how to write like that if he never let me to." When the deadline for the second report was due, Laura took the initiative and told the advisor she would take care of the future reports: "he wrote only one report; for the remaining ones, I explained that I needed to write them because I needed to learn how to write, and I wanted to learn to write." This sentence is strong because she saw that her lack of experience in writing could jeopardize her academic career. Her first attempt to write the reports on her own was through copying the rhetorical organization and lexical choices from the first report. Later, for her undergraduate thesis - a requirement for most bachelor's program in Brazil - she perceived that again another writing opportunity is

halted, “[my advisor] did not let me write the introductory section; I wrote the methodology, results, discussion, but the introductory part was what the professor had already done; I just added some things, I changed my way, I changed styles, I changed.” Editing the introductory section, mostly written by her advisor, seems to be her first attempt at writing an introduction.

Besides the little experience she had writing independently, Laura also shares being frustrated with her advisor’s “laid-back” attitude towards publication. She perceived that he discouraged her from publishing because he believed that only impactful research should be published. This mindset is common among some Brazilian professors/researchers because they believe the quality of research has been on the decline due to a growing managerial logic in public universities (Alcadipani, 2011). Her advisor aligned with this critique and argued that the Brazilian academia focuses on quantity of publication and not on quality:

My advisor was the first to study [subject] in Brazil; he was very experienced and against that system that you have to publish a lot. He argues that what was relevant should be published. He would not let me publish because of that. He already had his career settle down, and he did not need it, but I needed to.

Laura’s current difficulties to articulate some of the rhetorical moves in the introduction may come from this lack of experience in writing for publication. Besides the little experience in publication, her advisor’s feedback focused on “grammar and punctuation,” and hardly ever on the rhetorical aspects of an introduction. The only rhetorical aspects of academic texts her professor taught her was his writing style that consisted of avoiding the use of the first person and the preference for the use the passive

voice, which were later refuted by her U.S writing professor. Her advisor instructed her that, by using the passive voice, the writers distance themselves from the experiment and, thus, their study is more likely to be perceived as objective and unbiased, but her US writing professor asserts that the active voice and first-person pronouns increase clarity. As a conclusion, although Laura demonstrates respect for her advisor, she laments not having had an advisor that allowed her to go through the challenges of writing for publication.

2.1.4 Experience with research and writing outside the discipline in Brazil

To compensate for her limited writing exposure through her undergraduate thesis advisorship, Laura engaged in no-class-related research projects with other students from the same major. In group, she practices her ability of “straightforward and clear,” which her colleagues perceived as helpful for the result sections but limited to introduction: “because I'm more direct when I write, my introduction would be a paragraph, and my group would criticize my introduction for being too short, and that's why I was in charge of the other sections; I am straightforward.” Even for individual projects, other more experienced students helped her in revision: “my friends would help me revise ideas, formatting, and would come up with visuals to illustrate the information.”

Another relevant experience with research and writing introduction is her master's project she wrote to be accepted into a master's program. In Brazil, most master's programs require the candidate to write and present a research proposal to a committee. Laura tells that, during the introduction of her research proposal, she had to anticipate the limitations for research and that, unlike the project for the undergraduate program, a research proposal for a master's program “had to be taken seriously.” A master's research

proposal made her articulate the constraints in the introduction, such as time, equipment, and budget: “I had to be limited in time - it was two years - and I had to be limited to the equipment I had, with the skills I had.” When asked how she rhetorically articulated the innovative aspect of her research proposal introduction, again she says that she did not because it was implicit to the committee her project was innovative. On this occasion, although she read the literature and confirmed the innovation, she did not articulate as a rhetorical move in the introduction.

In this research proposal, she affirms that her concern in the introduction for her master’s project in Brazil was

...to present something that was well written, logical, and had good ideas as well to easily address the questions from the committee; in the first paragraph of the introduction, I thought of a person who never saw what an orchid was, and I am very generic, but then I start talking about more specific things, and because I do not have so much patience to explain, my introduction starts very plain but then it gets too technical.

In Brazil, she was already concerned with her unsuccessful attempt to address a broad audience avoiding the usage of a language that would exclude the non-academic readership.

2.2 Research and writing experience in the US

Sections 2.2.1 and 2.2.2, and 2.2.3 aim at prompting the findings of Laura’s writing in the ten-month writing experience in disciplinary contexts in the US. The findings result in the collection of data that reflect ten months of writing drawing on the US advisor’s feedback and the writing course’s instruction, but because Laura is

immersed in the learning process, she also heavily draws on the four-year undergraduate writing experience from Brazil, a required final paper for her bachelor's degree.

2.2.1 Writing Courses in the US

In the first six months of the master's program in the US, Laura took two courses related to writing. In the first course, she had an annotated bibliography that, even though it could have been useful to review the literature, Laura did not use it as part of the writing process of the thesis introduction. The second course, henceforth called Scientific Writing (SWC), aimed at writing a research proposal as the final paper; Laura seized this opportunity to start to outline the research to "impress the advisor with a project in the first semester."

Among other contents, the SWC professor taught the rhetorical structure of an introduction through what he called the "funnel design." As illustrated in Table 3, this design consisted of a top-down hierarchical arrangement of ideas that includes three paragraphs of key literature and 2 paragraphs for objectives and hypothesis:

Table 3

Scientific writing course handout with instructions to write an introduction

| Paragraph # | Expected move |
|-------------|--|
| Paragraph 1 | Broad perspective encompassing the research topic not mentioning any specifics of the study |
| Paragraph 2 | Intermediate perspective encompassing the research topic within the broader scope described in the first paragraph, but still no mention of any specifics of the study |

- Paragraph 3 The specifics of the study organisms, study site, etc., including a summary of preliminary data
- Paragraph 4 Clearly state the objectives
- Paragraph 5: Clearly state the hypothesis
-

Laura also followed the SWC professor's suggestions for using the style from the journal in which she hopes to publish. This requirement encouraged Laura to learn the journal formatting requirement and read articles from the same journal, so she can "pick up" the writing style, such as surface formatting (textual citation, margins, font, etc.) and rhetorical moves in the thesis, such as the sections of the papers, visuals and, especially, how introductions are composed.

Laura closely followed the guideline from the handout for both the research proposal and for the thesis. However, the professor imposes a restriction of three paragraphs to organize the arguments. This requirement interferes with the writing process because Laura has to summarize three months of research and stick to "only what was essential." Laura perceived the summary as counterproductive at first because she realized that introductions in research articles were longer but closely followed the instructions because she "wanted to get a good grade."

In addition to the writing professor space restriction, Laura had also faced constraints related to weather and equipment inadequacy and had to find a new topic for the research in the middle of the process. After overcoming the issues, the paper is turned into the professor. At the end of the semester, Laura gets her evaluation for the research proposal and finds out she got a B, a grade she finds unfair for two reasons. Firstly, the

professor's feedback reported, "the proposal was very good, but you're going to get a B because you're not a native." Laura is confused about the oral feedback and considers his justification "sheer discrimination" because she "was blamed for not being a native speaker." Laura reiterates her disagreement with the grade because, about the professor's written feedback, she claims: "he corrected only a preposition and a transition" in the proposal. Laura perceives that the grade was unfair because her advisor had previously revised the research proposal, and she claims not believing her advisor would let her hand in a poorly written paper. Even though the professor's feedback was not positively perceived, Laura admits appreciating his class as an opportunity to trigger her cognitive processes to work on her thesis. It is difficult to analyze what actually happened in this incident because this study did not go far enough to listen to the professor's reasoning for the feedback, but although Laura perceived SW course as positive to produce an introduction, the professor's feedback was not a fortunate event. My guesses are limited to pondering that the professor had no experience to approach an international student and provide feedback. He might have perceived a feeling of "foreignness" in her writing and lacked training on how to approach it. Her experience in disciplinary writing in the US shows that there is still little pedagogy to develop disciplinary literacy and that writing professors and instructor base their pedagogy on personal experience, which foments the inclusion of idiosyncrasies in the teaching of the sentence and text-level issues.

2.2.2 Advisor and Constraints in the US

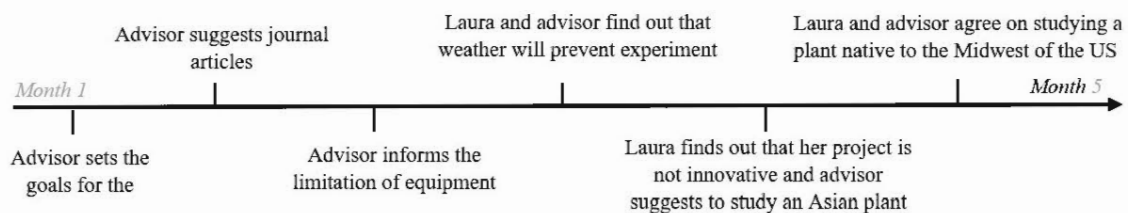
Laura established a very positive relationship with her US advisor. When she first turned in a paper to her advisor, she was "freaking out" and because she had never been

immersed in an English-only environment, she felt that her English was “fake.” After six months, she and her advisor built a relationship of trust, and her advisor started making praises to her writing: “my advisor sometimes praises my writing, saying I write better than some of his native students and that boosted my confidence.” The issue the SWC professor seems to have been compensated by the quality relationship with the advisor.

At the beginning of every semester, her advisor sets goals for Laura in regard to her research. At the beginning of her first semester, the goal was focused on reviewing the literature and selecting a topic for the thesis. Every two weeks, the advisor meets Laura to check the progression on the reading and in the paper. Therefore, her advisor closely influenced the introduction writing process because he suggested readings, provided feedback on the introduction part of the research proposal for the Scientific Writing Course and met every two weeks to discuss the readings. The timeline below illustrates the impact of the advisor’s meeting on the planning stage of the thesis introduction.

Fig. 8

Timeline of the impact of the advisor in Laura’s planning stage of the thesis



Because the writing professor required the research proposal to be in a format of a journal article Laura intended to publish, her advisor provided a list of journal articles of high and medium impact in her field. The choice of journal influenced Laura’s

introduction because she shared many times that she used the readings as a “model of good writing” or as “the model that works for scientific writing.” She seems to trust her advisor in every suggestion he makes. Although it is not possible to track back the exact dates of the meetings and the editions on Google Docs, it is possible to observe a correlation between the meetings with the advisor and the drafts generated in five months of planning.

In the translate stage, her advisor endorsed the “funnel design,” and she shares that, during this stage, she “perfects her text at its finest” before sending it to the advisor. Even though she already trusts her advisor, she still fears to convey a negative impression to her advisor: “I only ask the professor when I have something better prepared, because I’m a little insecure and I’m afraid to send something very bad drafts[laughs], and only after reviewing a lot, I send it to him.” However, most feedback provided in the translate stage is focused on “expanding the idea,” or “explaining an idea better.” The only sentence-level issue frequently denoted was preposition:

His feedback was focused on content. The only issue not related to content was my prepositions. Indeed, there was a text that I wrote, and he changed all the prepositions. I explained to him that I do not know prepositions, and he says that my prepositions were not wrong, but he only suggested some better ones. I always ask him how I can learn them, and he says that over time I learn.

Although it is in the translate stage, her advisor seems not to be worried about grammar and vocabulary accuracy in the first drafts. Even after the incident with the lower-than-expected-grade received in the writing class, Laura seems to care more closely about her advisor’s feedback. Some of his suggestions are “try to include more

examples here” (Advisor’s feedback in Month 7), and “this is not necessarily related. Perhaps make this a separate hypothesis.” (Advisor’s feedback in Month 7)

Some of his feedback also pointed out that his attempts to explain ideas and his comments resemble a dialogue they would have face-to-face. In other words, his comments in the introduction seem to be an extension of a conversation they started face-to-face:

Make sure you look into some other examples as well. In many cases, high light will decrease stem height (a photochromic response) and cause leaves to be smaller (sun leaves). Perhaps your species will be different, which would be really interesting, but try to establish more of what is known across species. (Advisor’s feedback in Month 7)

In a nutshell, the advisor focused on the content and did not emphasize grammar and vocabulary accuracy as his main concerns in the feedback. However, Laura’s interview suggests that he did not introduce any feedback related to the rhetorical organization until Month 7 in which she is asked to expand the literature review to show the gap in the literature.

2.2.3 Writing Center and Library

Laura used the Writing center four times and had three different consultants who helped her review the introduction. She has a positive perception of the Writing center, a non-existent service in her home country university: “I like the idea of having a writing center. I find it very useful, especially when you are insecure to hand in your assignment because you are not sure if you are conveying the right idea if there are no ambiguities.” The service was used for sentence-level issues since she perceived that a consultant who

is unrelated to her field could not help her in terms of ideas: “only once, when I went to the Writing center, the consultant made suggestions that changed what I was saying, but I thought I needed someone from my field of studies.” She found the service more useful for revision of prepositions, an issue her advisor frequently pointed out. Laura also reports that the writing center consultant introduced her the thesaurus and dictionaries that she frequently used in the revision and translate stage of her writing process.

Laura also reported issues in finding sources for the literature review. She evaluates the library in the US is limited in resources for her research topic, and because of this, she kept using her access to the database of the Brazilian university in the first semester in the US. When the Brazilian university permanently cut off her access, she uses her boyfriend’s institutional access. A plausible explanation for this constraint may be that both the Brazilian and her boyfriend’s US university are research institutions, whereas Laura’s university is a teaching university. However, Laura admitted not knowing about Interlibrary Loan, a service through which universities in the US borrow books and articles for research. Had she known this service, her limitation to resources would have been mitigated.

This section presented social factors that swayed Laura’s composing process. During her undergraduate program in Brazil, her professors provided a vague expectation for the introductory section, which influenced her to write to a broader audience. In the research groups, she was never in charge of the introductory section because her writing style was considered too objective for this section. For her undergraduate thesis, her advisor wrote the introductory section. From Brazil, she brings a perspective of meeting the expectation of disciplinary writing in Biology through using articles as a model. In

the first semester of her master's program in the US, she decides to engage in writing the introductory section of the thesis. The writing course provided a loose and vague rhetorical expectation, whereas her advisor did not provide any feedback concerning rhetorical moves until Month 7. Therefore, Laura finds herself in the middle of a cognitive process to sort out how to review the literature, a rhetorical move harder to grasp via using article introductions as a model. Both Brazilian and US pedagogical approaches to writing are largely product-based because they rely on the use of models and published texts. Neither professor nor advisors explicated how to explicate the rhetorical moves one should make to meet theirs and the readership's expectation. So far, Laura has been trying to figure out on her own what to do, and she is limited to genre awareness development, which seems to impede her from realizing the subtleness of the rhetorical as well as its variation.

3.0 Rhetorical Moves in the introduction: process and product of social interaction and cognitive activities

Until now, the cognitive processes have been influenced by the social constraints. Now, it is time to analyze the draft produced by Laura after ten months and discuss how the cognitive and social variables interplayed in the rhetorical choices employed in the introduction. Laura's introduction presents rhetorical features that result from her past experience in researching and writing in Brazil, from her scientific writing class in the US, and mainly from her advisor guidance. Laura reflects on her past experience writing introduction and learns that one of her introductions in Portuguese did not reach out to a large audience because it used a very straightforward and technical style:

I try to explain in a general way to reach everyone. For example, the master project that I did for Brazil, I did not do this, I was very direct and did not seek to be accessible because the people I would present that project and those who would evaluate me were all from my field of studies. So, I felt like I did not have to explain so much. In my thesis in the U.S, I'm trying to be more accessible. Even because I think it's better, and it makes more sense because if I write a very directed project, it limits the number of people who will read it. This is not good; I want more people to have access to my project.

The rhetorical organization follows the “funnel design” taught by the writing professor from the US and endorsed by her advisor. A broad audience guides her choice to provide basic information in the introduction, a perception of writing brought from Brazil. The draft generated after ten months of writing is shown below:

Table 4

Rhetorical moves analyzed in the thesis introduction

| Move 1: Establishing the field | Intention |
|---|---|
| <i>Parag. 1</i> “Light is the most important environmental signal and the primary source of photosynthetic energy for plants (Author, year). Consequently, the entire life cycle of plants is strongly influenced by a continuously changing light environment (Author, year).” | Persuade the reader by showing the importance of light. |

Move 2: Summarizing Previous Research

| | | |
|------------------|--|--|
| <i>Parag. 2:</i> | Factors that influence plant development | |
| <i>Parag. 3</i> | How plants interact with light | Explain a novice reader concepts of light, starting with broader concepts narrowing down to more technical concepts. |
| <i>Parag. 4</i> | How light influences germination | |
| <i>Parag.5</i> | Condition for germination | |
| <i>Parag. 6</i> | Light requirement for germination | |
| <i>Parag. 7</i> | Light and plant mechanism of defense | |
| <i>Parag. 8</i> | Light and flowering | |

Move 3: Preparing for Present Research

| | | |
|-----------------|---|----------------------------------|
| <i>Parag. 9</i> | “Most of the studies on photobiology are about commercial species and little is known about native species of the state of [name of the state] and its region in the United States of America.” | Present a gap in the literature. |
|-----------------|---|----------------------------------|

Move 4: Introducing Present Research

| | | |
|------------------|--|--|
| <i>Parag. 10</i> | “Therefore, I am going to analyze the possible physiological responses of four [name] species natives to [name of the state] to different light intensities, | Present the objectives of the study and the method |
|------------------|--|--|

focusing in three phases of their
development: germination, vegetative
development, and flowering.”

Parag. 11 Method

3.1 Move 1 – Establishing the field

The introduction starts as “[l]ight is the most important environmental signal and the primary source of photosynthetic.” Using Swales (2011)’s CARS model, this move is defined as “showing centrality by topic importance.” Three factors have apparently influenced Laura’s introductory opening. First, she shares that she followed the Scientific Writing Course professor instruction, which consists of sentence 1 addressing a “broad perspective encompassing the research topic not mentioning any specifics of the study.” Second, as shown in the three excerpts below, “showing centrality by topic importance” is a move observed in three out of the five articles used as references in Laura’s introduction. This evidence reinforces the claim that journal articles are used as a model for rhetorical moves since the signal phrases “important” and “primary” are also observed in Laura move 1.

“Light is one of the most important environmental factors that regulate plant growth and development (Author, year).”

“Among various environmental factors, light is one of the most important variables affecting phytochemical concentrations in plants (Author, year).”

“Light is an important resource for photoautotrophic higher plants in survival, growth, and distribution (Author, year).”

The third reason may draw on her perception of academic language underpinned on objectivity. I inquired whether she would operate move 1 referring to her initial amazement to how plants survived in such a “hostile environment in the Midwestern US.” She said it is not common to include personal experiences in writing because they are subjective. Therefore, three are the factors that influences move 1, the vagueness of the writing course instructions, the frequency of common signal phrases present in articles, and the perception of academic writing. Although the choice denounces that Laura’s first sentence is move 1, she disagrees and argues that sentence 1 is already part of the literature review, which is move 2. Her disagreement may come from the fact that, for her, citing someone’s work serve solely as move 2 and not as opening for move 1. However, I still argue that the first sentence is part of Move 1 because, as Swales (2011) observed in 48 articles, move 2 has a more descriptive tone, whereas move 1 usually aims at persuading the reader, an aspect she expresses when using the words “important” and “primary” to establish her field of study.

3.2 Move 2 – Summarizing Previous Research

Laura shares that move 2 was very challenging. However, unlike other studies that usually oversimplify that the lack of vocabulary and grammar causes move 2 to be troublesome for international graduate students, Laura’s case brings to light that cognitive, rhetorical as well as social factors also contributed to this difficulty.

Two issues start at the planning stage and are related to a rhetorical problem and a metacognitive problem at the planning stage of the writing process. Laura’s original plan was, after move 1, to explain basic concepts since she aims at writing to a broad audience. Therefore, she postpones the literature review and starts an intermediary move

that I will call “summarizing basic concepts.” This basic concept, as she shares, comes from her knowledge in Biology learned in the undergraduate program. Therefore, so far, by adding an extra move, her introduction contains three moves: establishing the field summarizing basic concepts (for a broader audience) and summarizing previous research (for a specific audience). Postponing Swale’s move 2 (summarizing previous research) seems to be influenced by two factors: (i) her rhetorical intent to address a broad audience and (ii) her lack of knowledge of metacognitive tools to go through the process of writing move 2.

In relation to (i), she aims at a broad audience because she wants her introduction to be more accessible to a less experienced writer, be more inclusive and, as she reports, “have a greater impact in society.” This rhetorical choice seems to reflect the same concept of an audience she shared having imagined in a research proposal in Brazil, “I thought of a person who never saw what an orchid was, and I am very generic.” In relation to (ii), the lack of knowledge of metacognitive strategies, Laura suggests that, although she is aware of the existence of the move “summarizing previous research,” she postpones it because she finds it “overwhelming:”

I think it's important, but there was a lot to do, and I had to finish a draft to send it to him. So, I thought about the next stages through which I had to go through, and I postponed this part of the introduction, and I planned to expand this part only in the future. Someday I get frustrated, I do not feel like writing anymore, and I call it a day. It is overwhelming.

Her frustration and feeling of being overwhelming suggest that she lacks knowledge of metacognitive strategies to collect and organize information from reading.

As explained in section 2.1.1, 2.1.2, and 2.1.3, Laura did not have experience of writing an introduction in Brazil, which led to her lack of experience of the writing process of reviewing the literature. As a result, she is still figuring out metacognitive solutions for reviewing the literature for the thesis. At this point, her strategy consists of paraphrasing the finding in the same document as she writes the thesis. This strategy seems not to be successful since she perceives that this stage is overwhelming and frustrating.

The third issue is found at the translate stage when Laura and her advisor seems to have a miscommunication issue on the intent of move 2. This issue is suggested because, while Laura is working on “summarizing basic concepts,” her advisor requires her to review her writing including citations in every sentence of this move. Although Laura does not understand the need to cite what she considers “common sense,” she follows his direction. Her advisor seems to interpret her move 2 as a result of the readings when, actually, Laura is not drawing the concepts from readings, but from her previous experience. As a result, they don’t seem to be on the page on what it is expected from the literature. For seven months, the focus of the reading was not to confirm a gap in the literature (advisor’s apparent expectation) but to look for articles containing the assertion that supports what she had written (Laura’s interpretation of the advisor’s expectation). Until now, her focus on broad audience and the miscommunication with the advisor are reflecting on issues in executing move 2. Only in Month 7, her advisor provides more directive feedback stating that “it is mandatory to expand the review of literature of plants in Midwest of the US” to prove the gap in the literature and transition to move 3. Until now, three are the possible reason for Laura be struggling in move 2: (i) the rhetorical problem in defining the reader, (ii) metacognitive problem to track the planning stage of

reviewing the literature, and (iii) the miscommunication between advisor and advisee. However, Laura is still developing genre awareness, which also interferes with the execution of move 2.

The fourth reason why the review the literature is confusing may also come the fact that, as reported in section 2.1.1, 2.1.2, and 2.1.3, she reveals using the articles she reads as models for writing. Furthermore, she shares that her writing professor and advisor recommended her to follow the requirement of the journal she intends to publish as models of writing. To confirm the extent to what Laura draws on articles she reads as a model, I analyzed five of the most often cited articles in the introduction to find some rhetorical features she might have drawn upon. As a result of this analysis, I found three types of influence: textural citation frequency, textural citation style, and rhetorical moves.

Regarding textural citation frequency, Table 5, first, shows the percentage of sentences containing textural citation in the articles and, then, compares this rate to Laura’s introduction. Laura’s textural citation (88%) is higher but still close to the average of the article (72%), which validated her advisor’s feedback on the need for citation.

Table 5

Comparison of the frequency of textural citation in Laura's move 2

| Journal Article used as a reference | Number of sentences in Move 2 with citation out of the total number of sentences in the introduction | Percentage of sentences with textural citation |
|-------------------------------------|--|--|
| 1 | 8 out of 15 | 53% |
| 2 | 33 out of 44 | 75% |
| 3 | 12 out of 16 | 75% |
| 4 | 11 out 17 | 65% |

| Journal Article used as a reference | Number of sentences in Move 2 with citation out of the total number of sentences in the introduction | Percentage of sentences with textural citation |
|-------------------------------------|--|--|
| 5 | 16 out 19 | 84% |
| Average | 80 out of 111 | 72% |
| Laura's introduction | 4 out 18 | 88% |

Concerning the second analysis, citation styles, Laura's final draft shows that she prefers to use parenthetical citation style rather than textural citation because her advisor also recommended the use of former style. Again, the journal article introduction validated her advisor's recommendation. To illustrate, below it is an example of editing made by Laura because of her professor's feedback, which she admits not understanding why "for me, there is no difference between two ways of citing, but I wanted to make my advisor happy."

| | |
|--|--|
| <p>Draft before the advisor's feedback:</p> <p>"Milberg et al. (2007) concluded it is more likely for small-seeded species to have light as a requirement for germination than large-seeded species."</p> | <p>Draft after the advisor's feedback:</p> <p>"[...] it is more likely for small-seeded species to have light as a requirement for germination than for large-seeded species (Milberg et al., 2000)."</p> |
|--|--|

The last analysis, related to the rhetorical move 2 employed in the five articles, also match Laura's rhetorical move 2. I identified in the article the sentence with the signal phrases where they point out to the objective of the study, and both Laura's and article's introduction aim at providing concepts in Biology. However, whereas Laura is working on a thesis that aims at finding a gap in the literature, the article introduction aims at reviewing other studies as evidenced below by the signal phrases underlined from the article:

“In this review, we describe the phenotypic effects of R and FR lights, as well as the mechanisms underlying them...” (Article 1 excerpt)

“This review summarizes recent data on the effect of light and temperature stress on the function of plant cells in the context of...” (Article 2 excerpt)

“In this context, this review focuses on plant responses to UV and blue lights, with an overview...” (Article 3 excerpt)

“This literature review presents data on the physiological responses in vegetables linked to light quality under different colored shade nets....” (Article 4 excerpt)

“This review summarizes recent data on the effect of light and temperature stress...” (Article 5 excerpt)

Laura seems to use articles that have a different rhetorical purpose from her thesis'. Whereas the article intends to review the literature of other studies, Laura's objective is to present a new study. Analyzing move 2 in the five articles, they all define concepts and cite them. Consequently, Laura's final draft suggests that she replicates this solution. However, it is unclear whether (hypothesis one) she consciously borrowed this rhetorical strategy or (hypothesis two) she was not aware that an article review introduction differs from a thesis introduction because they address different rhetorical situations. It is clear nevertheless that move 2 is the result of cognitive efforts to meet her own expectation of writing, the expectation she gathers from the journal articles, and from her advisor and writing course instructions.

To sum up, the factors hindering the execution of move 2 are:

- the rhetorical problem in defining the reader;

- the lack of metacognitive tools to track the planning stage of reviewing the literature;
- the miscommunication between advisor and advisee;
- the lack of genre awareness.

This study does not aim at evaluating whether Laura's solution is right or wrong. First, because she is still in the middle of the process and it is unreasonable to judge one's process as a product. Second, this study aims at analyzing how her writing reflects the social constraints and cognitive processes of an international graduate student.

Undoubtedly, Laura would have benefitted from a more scaffolded writing process that included, as Devitt (2009) suggests, being taught about reading not as a model but to find rhetorical solutions to review the literature. During the analysis, she should not only copy structures without being aware of what they do to the reader. Therefore, in the pedagogical implication section, I suggest an alternative on how advisor and writing professor can scaffold the process of rhetorical genre awareness in disciplinary context, avoiding that the graduate student develops from a stage based on modeling, as Laura presented, to a stage where models are one of the possibilities for rhetorical problems.

3.3 Move 3 - Preparing for Present Research and Move 4 (Introducing Present Research)

Laura prepared for her present research by "indicating a gap" (Swales, 2011) as suggested by her lexical choice: "Most of the studies on photobiology are about commercial species, and little is known about native species of the state of [name of Midwestern state] and its region in the United States of America." Gap-indication is a

common move in introductions signaled by phrases “little is known about,” “further studies are necessary” “X calls for more investigation,” which refers to the need of further research in the field.

Move 4 is employed by what Swales identified as “describing present research:”

Therefore, I am going to analyze the possible physiological responses of four [NAME OF SPECIE] species natives to [NAME OF THE STATE] to different light intensities, focusing in three phases of their development: germination, vegetative development, and flowering.

Move 4 contains the three features frequently observed in the 48 introductions. First, she used “the” and switches to the first person, which indicates a transition from move 2 to 3. Laura employed Move 3 and 4 as complementary as observed in Swales’ analysis.

Overall, Laura performed move 1, 3, 4 using signal phrases that she probably borrowed from the reading. However, she did not find textual clues to be borrowed for her texts because, first, move 2 rhetorical organization varies and, second, the move 2 in the readings aimed at reviewing other studies instead of finding a gap in the literature. If she develops genre awareness, she will be able to conceive the variation of the pattern as freedom instead of constraint (Devitt, 2009). In addition, she needs to develop a metacognitive tool that will facilitate her planning stage to collect and organize the findings in the literature to later be able to compare and contrast until she articulates a gap.

DISCUSSION WITH THE LITERATURE

Herein, I discuss and relate my findings to other studies presented in the literature review, which greatly contributed to this study.

The Writing Processes of International Graduate Students

This section will discuss the findings of this case study with other pieces of research on international graduate students' writing. This study finds many similarities and some differences with other pieces of research mentioned in the literature review regarding sentence-level issues and writing of international graduate students' writing their thesis or dissertation in English.

Similar to previous studies (Chien, 2015; Yeh, 2010; Silva, 1992), finding an original topic for research was also an issue because Laura spent a considerable amount of time searching for a relevant topic in the US university research context. Her difficulties were not in locating her research in the "big picture" but choosing a relevant and new topic that would address in the US local community context. It is interesting to notice that the abilities to select a relevant, new and feasible topic were previously learned while researching in Brazil. The use of Portuguese, Laura's L1, seemed to have increased her creativity in the planning stage and increased her productivity in the translate stage since the core knowledge present in the introduction comes from her experience researching in Brazil.

In the planning stage, metacognitive processes seem to be vital for both NS and NNS graduate students to access, and process long and short-term information. While the notepad registered her short-term memory ideas, the bullet journal helped her to reflect her experience in writing and research in her home country. Like Odena and Burgess

(2017) reported, metacognitive tools helped increase productivity, maintain focus and motivation, and manage time. Without exploring metacognitive tools, Laura would have been lost in the planning stage. Metacognitive tools in the planning stage seem to have helped Laura be productive because they allowed her to focus on ideas instead of grammar and vocabulary accuracy. In the translate stage, metacognitive tools - such as dictionaries and thesaurus - were widely used to help Laura find more accurate lexicon.

Regarding the limited repertoire of vocabulary, akin to Silva (1992), this study confirms that non-native graduate students have difficulties to express their ideas accurately and precisely and to manipulate lexical nuances. However, unlike the finding in Silva (1992), Bitchener & Basturkmen (2006), and Dong (1998) in which graduate students perceived their lack of vocabulary as a hindrance in the translate stage, Laura's limited repertoire of vocabulary was surprisingly perceived as an advantage. In other words, Laura perceived her shortage in vocabulary as an advantage for her writing in English since, unlike to what she reports to happen when writing in her L1, she finds herself with fewer possibilities to express the same idea. It is important to remind that Laura scored B1, and intermediate proficiency in English, which allowed her to use her vocabulary to "communicate straightforward ideas." (Cambridge, 2016). As a result, her writing in English is perceived as more objective and straightforward and focused on the idea instead of accuracy, whereas in her L1 is more indirect and confusing, which demands more energy spent on revision.

Silva (1992) also reports on a Japanese graduate student that found easier to revise in English than in his L1; an interesting remark is that the Japanese graduate student found academic writing in English less challenging than in Japanese because he

had had more formal instructions in English and had virtually previous experience with writing and research in his L1; in other words, English was the only language in which he was academically literate. Laura, nevertheless, had more formal instruction in Portuguese and plenty of experience in research. It is reasonable to suggest, accordingly, throughout the writing process, academic skills are transferable across language.

This study also suggests that the advisor is a frequent component in the review stage. Like in Gao (2012), Laura finds the use of preposition an issue, but unlike in Gao, not she but her advisor pointed out this mistake while reviewing her paper. Unlike Cheng (2007)'s study in which that English-native reported as unable to provide grammatical assistance, this study shows that the advisor could help to highlight the mistakes although Laura shared that her advisor was not able to explain why her preposition usage was not considered correct. Unlike Bitchener & Basturkmen (2006), this study shows that advisor and advisee did have a similar perception of writing. Bitchener & Basturkmen found out that "students tended to see their problem more at the sentence level, whereas the advisors saw it more in terms of creating clear meaning at the paragraph level" (p. 13), but this study suggests that both advisor and advisee have concerns with "clear meaning at the paragraph level." A plausible explanation may be because both Laura and her advisor have a similar approach to writing, thus, both perceive that good writing is based on clear ideas. This study, therefore, suggests that the translate stage is more productive when advisor and advisee share a similar perception of academic writing. Besides the advisor, a writing course also constrained the planning stage because Laura had to summarize four months of readings in three paragraphs. No other studies have reported another source of influence in the writing process other than the advisors.

Another missing piece of information in literature is on how students organized their ideas in the writing process. Metacognitive tools, namely the notepad and the bullet journal, were important in Laura's planning stage because they created opportunities for her to access her previous knowledge and reflect on how to solve social constraints faced in the writing process. They also proved to increase writing productivity since Laura used her L1 more often in the metacognitive tools than in her drafts. There seems to be less pressure to write in English when an intermediary genre is being used.

This finding aligns with Bazerman's claim that writing reflects the writer's cognition. This case study suggests that metacognitive tools can serve as an intermediary for graduate students to organize and connect pieces of information, especially in the literature review for the introduction. From a genre theory perspective, metacognitive tools can be interpreted as metagenres, which Carter (2007, p. 393) defines as "a higher category, a genre of genres." It is possible to infer that, if Bazerman (2009) defines genre as metacognitive tools, metagenres could also be metacognitive tools that intermediate how one writes genres since this study suggests that writers also change their cognition through their use. Laura's cognition changed not only when she wrote in the more structured draft of her paper on the computer, but also while planning and organizing her ideas and other genres.

The Sociocultural Interplay into the Cognitive Process

The social interaction profoundly shaped Laura cognitive processes. When she arrived in the U.S, her writing experience had been the result of the perspective in writing was first developed in her home country through the interaction with her previous advisor and professor and also with more experienced graduate students and peers from research

projects in and out of the classroom. This study complements Motta-Roth (2012)'s contention that two kinds of perceptions arise in undergraduate students: "1) learning mediated by teachers in regular classes and lectures or 2) education mediated by symbolic and material research activities

In her study of academic literacy in a Brazilian university [t]he kind of insertion students have in the discipline depends on how much they seek research opportunities and mentoring, beyond the lecture halls and classrooms." (p.108) Laura shared that her mode of learning situates in-between of the continuum line of the two extremes ascribed by Motta-Roth's and, similar to Li (2007)'s findings, this study also suggests that Laura's academic writing developed because of both of the support for writing in the discipline and of her engaging to the research community both in Brazil and in the US. Therefore, this confirms that both in and out-of-class experience must align closer, that is, regular classes - either writing courses or writing in the disciplines programs - have also to support graduate students trying to meet the demands imposed by the research community out of the classroom.

The bigger the gap between classroom and research is, the less prepared and confident graduate students will be when writing their thesis and dissertation. The earlier classrooms incentive students to take agency of their writing, the smoother the transition and more positive the experience a final graduate program is regardless of the language. This assertion also directs to professors and instructor in the student's home country, too, because, as Li (2007) reported, students with previous research experience develop agency in their disciplinary writing and tend to accumulate skills that will be transferred to the graduate program in which English is required.

As reported in Cho (2004), Li (2007), Laura's case study also suggested that her writing skills of a graduate student in the USA keep being cognitively developed through the interaction with professors and instructors. Unlike Cho (2004)'s participant, however, Laura does not have publication experience, which she acknowledges as a missing social opportunity to further develop her academic writing in a disciplinary context. Laura had research experience but never faced the challenge of meeting the standards of a journal article. The U.S experience is offering her this opportunity because both her advisor and writing professor stimulate her to write her thesis meeting the journal article's standards. Like Cho's participants, Laura had assistance coming from only native speakers to write the thesis. Her writing professor guided her in the rhetorical moves for an introduction, her advisor reviewed ideas, and the writing center reviewed the ideas and helped in the sentence-level issues. Besides her advisor and writing professor, the only assistance from native speaker Laura had was from the Writing center, which she judged as more useful as editing because the consultants did not have disciplinary knowledge. Apparently, for Laura, the importance of writing-peers does not rely on whether they are native speakers or not but on their knowledge of Biology. Furthermore, although all three sources of help are immensely significant, as Bazerman (2009) posits, they do not align since each source represents a different perception of academic writing. The advisor focuses on and the writing center reflect a perspective of writing as an individualized cognitive process because his feedback focuses on expanding and clarifying, whereas the writing consultant helped her with sentence-level issues; the writing professor conveyed a more rhetorical perspective but focused on the persuasion of a general reader rather than a specific audience of a highly disciplinary context of a thesis. As a result, after ten months, Laura

learns and applies these three perspectives to her introduction but has not developed rhetorical genre awareness, that is, writing by choosing the rhetorical moves aware of the genre and the members of the research community that use and modify this genre.

Similar to Odena and Burgess (2017)'s research, this case study indicates that the relationship with the quality of the relation may influence positively or negatively in the writing development of the graduate student. Laura perceived her coach as a "facilitative coach" for a couple of reasons. First, both have a similar perspective on academic writing. Laura's writing process showed a tendency to focus on shaping the idea and increasing clarity, and her advisor's first month of feedback focuses on expanding the idea. Therefore, Laura always perceived her advisor's feedback as useful. This study suggests that advisor and advisee that share a similar perspective of writing tend to have a less conflictual and more productive relationship, which reflects in a smoother transition to the translate stage of the writing process. However, sharing a common view of writing with the advisor also brought a side effect because both ignored for seven months the rhetorical demands of thesis introduction, which results as her inability to conduct move 2 – review the literature.

Case studies usually reveal the international students perceive their "foreignness" as a drawback to disciplinary writing, but hardly ever offers the origin of the perception. Laura's case study suggests a glimpse of what one of the origins for this negative perception: feedback in the writing of international students. A native speaker may encounter difficulties to provide feedback in a non-native student writing because they pattern of mistakes may seem illogical and, even when there are superficial mistakes, they might feel something is "off" but don't know how to address them in feedback. The

prose, the lexical and rhetorical choice, the tone and voice may sound foreign, but native instructor and professor may not have the metalanguage to address them and end up with comment like Laura reported having: “ the proposal was very good, but you're going to get a B because you're not a native.” Although Laura perceives it as discriminatory feedback, the professor might not have experience on how to address foreign writing and may not be aware that subtle aspects, such as prose, voice, and rhetorical patterns of writing varies according to the culture. As Bazerman (2009) comments in *Genre and Cognitive Development: Beyond Writing to Learn*, the professor’s knowledge in disciplinary writing may be so intrinsic and engrained in his cognition that he cannot break it down into steps and accessible language for novice writers:

While there may be moments that hail us back to our earlier more naïve stance towards language, for the most part, we find it hard to remember what language felt like before we incorporated our technical sense of it. We notice and are frustrated when our students don’t have that same relation to language that we do, not seeing it the way we want them to see it, not identifying language practices how we would like them to, not able to make language choices on the basis of the principles that now seem natural to us. (p. 288)

The lack of metalanguage and pedagogy that break down the process of disciplinary writing may be more common especially for professors and instructors who usually have no pedagogical training to teach writing, which makes them rely on their personal academic experience in writing and publishing in addition to their personal beliefs of writing. This personal experience is valuable when teaching but may be limiting to instruct novice writers, especially non-native speakers, since experienced

writers in disciplinary fields may not know how to guide writers in subtle aspects of writing and, because of this, they may opt to stay in the comfortable zone of teaching academic writing on the basis of grammatical correctness, such as the use of passive or active voice, verbal tense usage, preposition and other lower-order concern writing issues.

Episodes like this may be more common as it seems, but they may hard to be reported in case studies because they may be sensitive to the student. Also, the written or oral feedback may not even state the actual reasons for the given grade, and the focus on lower-order may be used to disguise that the professors' or instructor's real perception of international student writing.

The Genre Rhetorical implications of Writing in the Disciplines within an English-speaking country

This study substantiates the claim from other studies (Yeh, 2010; Nimehchisalem, Tarvirdizadeh, Paidary, & Hussin, 2016; Ho, 2013; Odena and & Burgess, 2017; Cheng, 2007) that reviewing the literature is the most challenging rhetorical move in an introduction. However, unlike in Yeh (2010), Laura's difficulties in reviewing the literature do not come from "mining sources, integrating, and synthesizing ideas and theories" (p. 6) but from her ongoing process of refining the audience and developing her genre awareness as suggested in Silva (1992), Dong (1998), and in Bitchener & Basturkmen (2006). This study confirms that disciplinary writing requires graduate students to aim at a more specific audience when reviewing the literature as a persuasive rhetorical move. Besides, they need to raise their genre awareness by perceiving introductions from thesis as possibilities of rhetorical moves instead of models of

correctness (Devitt, 2009). Unlike Dong (1998), this study did not point out that the advisor perceived the advisers writing lacking familiarity with the rhetorical and genre convention. The lack of attention to audience and rhetorical awareness from both advisor and advisee resulted in a delay of development of the needed skills of writing in the discipline. This study confirms Dong claim that the level formality is an issue a graduate student may face, but, contrary to Dong's claim, objectivity, concision, and precision were not struggles identified in this case study. It is important to keep in mind that, unlike other studies that accompanied the process and product, this study aimed at investigating the process and locating the standpoint of Laura cognitive development after ten months of writing. It is expected that, by the end of the process when her thesis is due, her cognition may have developed to achieve a full-fledged development of genre awareness of the expectation from a thesis introduction as Cheng (2007) reported on his focal student cognitive development. What might explain Cheng's focal student's cognitive development was the fact that, unlike Laura, he had had plenty of experience in publishing, which helped shape his cognition toward genre-awareness.

Gao (2012)'s main claim is that the contrast in cultural schemata influences the rhetorical choices made by an international student writing in disciplinary contexts in English. Whereas Gao asserts that the Chinese Confucianism school of philosophy of collectivism prevails over the individualism, Laura also suggested that her intent to write was directed to a more collective than a restricted number of readers. The philosophy behind Laura's choice for a comprehensive readership may account on the fact that, because Brazilian public universities are entirely funded by tax money, institution policies reinforce that the knowledge in the university must be accessible to the

community. Up to the tenth month, it is unclear whether Laura lacks knowledge of audience or she applies her previous cultural experience to choose to what audience to address.

Unlike other studies, Laura's case study brings to light two implicit aspects of researching in disciplinary contexts that not only impact but also drive the writing process and the rhetorical choices: feasibility and innovation. Feasibility is the aspect that, although it seems to be invisible in the rhetorical moves she employed, drove Laura's rhetorical choices and was the cause of most of the revisions. Appropriate weather, equipment availability for the experiment completely changed the goals in the writing process and caused Laura to change the rhetorical moves. Innovation also impacted the writing process because it caused Laura to restart the writing process and restructured the rhetorical moves after she found another study that addressed the same objective. Therefore, Laura's case study adds feasibility and innovation as two extra factors that have not been mentioned in the literature.

PEDAGOGICAL IMPLICATIONS

Laura's literacy experience in disciplinary writing both in her home and US university carry pedagogical implications. In Brazil, students that are about to come to the US will benefit from a pedagogy that, rather than prescribes a formula to write, raises student's awareness that writing changes according to the culture, to the situation, and to the genre. Teaching the IMRD (Introduction, Method, Result, and Discussion) model is not enough to prepare Brazilian student to write in disciplinary contexts, much less in the US, where the academic culture will contrast with the Brazilian academic culture.

Undergraduate students in Brazil that contemplate the possibility of studying abroad need to be sensitized to notice and be able to act upon the rhetorical nuances of writing and deal with extralinguistic factors, such as negotiating with the advisor, finding means to obtaining resources for research, understanding and performing in the classroom environment, etc. Likewise, the US institution should implement a writing pedagogy based on a perspective that writing changes according to the culture and that are extralinguistic elements to the process. In this view, both Brazilian and US universities should align their writing pedagogies in a way that the Brazilian university prepares students that can more quickly adjust to a different culture and that US universities adjust their practices to help students to more smoothly transition from their home to an English-speaking university. If both home and foreign universities establish communication and common understanding that writing is dependent on culture and extralinguistic factors, international students will more quickly adjust and engage in the research community, which will strengthen international collaboration in research.

Above implications may be applicable to international as well as domestic graduate students. I will start from the implications that more directly apply to international students and then move on to the pedagogical implications for disciplinary writing for both domestic and international population in master programs.

Concerning the international students, in the planning stage, professors can guide international students who experience a shortage of vocabulary to find metacognitive tools to acquire and refine vocabulary. First, collocation dictionaries can help students find appropriate combination of parts of speech that are commonly perceived as confusing especially because of L1 interference or the idiosyncrasies of the English

languages; for example, speakers of Portuguese as L1 may find confusing the difference between the verbs “do” and “make” and they have trouble with prepositions (I would not be surprised if you come across with some unusual preposition usage in this paper since Portuguese is my L1). Both issues of prepositions and make/do collocation are confusion more likely caused by interference of the L1 and the lack of standard rules in L2.

Collocation dictionaries are often cited as a helpful source to overcome this difficulty.

The second source is thesaurus, often recommended by students who feel that they repeat the same words or who feel that their lexicon does not allow them to be expressive of their thoughts as precise as in their L1. Language corpus is a tool rarely used by non-native speakers, but it proves to be a useful source unsure about the word usage in a native context. A famous corpus is COCA (Corpus of Contemporary American English), which is an online word search free of charge that shows the word frequency of usage, context (spoken, academic, magazine, etc.), and whether the word is trendy or not.

Another metacognitive strategy oft-reported is the L1 usage when generating ideas in the planning stage. Laura’s planning stage was filled with code-meshing (including English and informal Portuguese), and she reports that her ideas flow better when she does not have the pressure to produce perfect sentences in English or in Portuguese. L1 is an asset for them to more quickly retrieve their knowledge, especially for students who had studied their undergraduate program in their home country and are still developing their proficiency in English. The rule of thumb would be to free students to use the language they want and encourage those who still struggle with English to consider trying their L1 when generating new ideas. Laura’s experience reveals that, in the review stage, a native speaker of English may be helpful, but limited to help in finer aspects of writing that are

highly disciplinary; therefore, having member of the research community who is proficient in the disciplinary writing of the graduate student may also be important regardless of their L1. Although most of these tools and strategies are designed to help non-native speakers, they can benefit native speakers who feel that academic English is foreign to them.

The following pedagogical implications apply to both native and non-native speakers since disciplinary writing is usually challenging for first-year master's students regardless of their L1. Although limited to one student, this study aligns with Bazerman's sociocognitive culture and suggests that disciplinary writing course may more efficiently promote graduate student literacy through a genre pedagogy that considers the social, cultural, and cognitive aspects of writing. Laura's case study suggests that disciplinary writing is one of the most expressions of the culture in a specific field of the academia. This culture, like any other, is constantly formed by interaction among the members of the community. This interaction produces patterns of discourse that may go across countries as evidenced in Laura's case. Her Brazilian disciplinary field brings assumptions that, in most parts, matched the tradition in the US university because the ideology of the academia in Brazil seems to be closely influenced by the North American higher educational system. On the other side, patterns of discourse also change according to the country. This distinction may be observed within the same institution, e.g., her advisor and professor presented different views of writing and, therefore, different expectations were held upon Laura's introduction.

As a whole, the more students interact with the academic culture, the more their cognition is shaped. The difference is whether the student is aware or not that this culture

is based on ideologies of writing, which leads writers, especially non-native ones, to believe that genres are fixed and immutable. Only after students are aware that genres are not to be followed as strict rules but used as metacognitive tools (Bazerman, 2009), they can perceive the texts they read not as constraints but as the freedom to write (Devitt, 2009).

These assumptions imply that graduate student ought to be taught that genres are made of patterns as well as variations, caused by the specificity of the rhetorical situation a piece of writing addresses. In Laura's case, she struggles with the literature review and has not yet succeeded to write her own because she is trying to figure it out by adopting model as restriction instead of alternative (Devitt, 2009) for her to compose her own literature review. However, no other journal article or thesis introduction will provide her with all the rhetorical moves and signal phrases that she can copy that will solve her rhetorical situation.

For her to succeed, she will need to be aware that her thesis introduction is unique because it responds to a unique rhetorical situation (Bitzer, 1968). Other studies can offer her clues on how to rhetorically use the previous studies for her to convince the audience, but she is the one who will have to create a solution that both meet hers and her research community expectations. For professors to be able to scaffold a student to go through this process of development of awareness, they also have to be willing to become aware of the genre as texts that vary not only according to the research community but also according to the rhetorical situation. For this purpose, based on Laura's case study and my experience as an international student in the US, I offer pedagogical possibilities, to review the literature while creating a research space:

- 1) **Analysis of introductions as part of the genre:** the steps below helped me understand how introduction can be written not using my reading as models but as references of possibilities of rhetorical moves:
 - a. bring introductions of the genre they are working on;
 - b. reflect the purpose of the genre, the audience it addresses, and what it does for the paper as a whole;
 - c. introduce Swales CARS model explaining that introductions are composed of moves;
 - d. identify these moves in their introductions;
 - e. explain what each move does, paying attention to whether the literature review is used to convince the reader of argument or not.

- 2) **Develop a set of metagenres that will help the student review the literature:** graduate students will benefit from being aware that writing is a process rather than a product. For this, advisor and professor can stimulate students to think of the set of metagenres/genres involved in the production of a thesis introduction, more specifically, to review the literature. Metagenres may include annotated bibliographies, notepad, spreadsheet, bullet journal that help them collect information from reading to later contrast, compare and relate to one another. Teachers and students may share among themselves strategies, but students may also benefit from contacting and conducting ethnographic interviews with other experienced disciplinary writers to learn metagenres they have used while digging the books, articles, and the internet. This activity is a chance for students to understand, as Bazerman (2009) claims, that each writer engages in a different set

of metagenres or genres to achieve a final product. Consequently, instead of seeing writing as a polished finished product, novice writers can see it as an individual process adjust to each writer's cognition as well as a set of rhetorical moves that address expectations from different sources.

- 3) **Learn from antecedent genres:** Teacher may also work with introductions from other genres the students have worked on. Ask students to bring other papers in which they wrote an introduction and ask them to analyze the moves they performed. From this analysis, the professor may inquire them the reasons for those moves (present, introduce, convince, etc.) according to the rhetorical and audience. The professor can invite students to revise the introduction in order to use the review of the literature as a rhetorical move to convince the reader of a gap in the literature.
- 4) **Adjust metagenres to the student cognition:** annotated bibliography is the most often taught metagenre to help students contrast, compare, and find a gap in the literature. However, annotated bibliographies are frequently taught as a metagenre with fixed and strict rhetorical moves; for instance, Purdue Owl – one of the most visited websites as a reference for academic writing – defines the rhetorical moves of an annotated bibliographies as to i) summarize, ii) evaluate, and iii) reflection on a source of information. However, these three moves may not match the students' approach to reading an article. Laura, for instance, first read studies to make sure they are innovative or not; in a second stage, she reads their abstracts, and then their findings. Her solution is to paraphrase the findings as soon as they are read, which is a valid strategy, but it is limited because it does not help her

compare the studies' finding, method, and discussion to later elevate her disciplinary writing to a more sophisticated and rhetorically articulated in the translate stage. A viable solution is graduate student be able to adjust metagenres to the rhetorical structure of the sources. For example, Laura needs to compare the effect of light in plants; therefore, it is reasonable if she decides to specify the rhetorical move "summarize" as to "summarize the positive and negative effect of light in plants." For this to happen, professors need to encourage and allow students to adapt rhetorical moves of the metagenre. The annotated bibliographies should be flexible but should also encompass a reflection of the audience each reading is addressing. Through this reflection, Laura could have planned the rhetorical moves that addressed a specific audience since the beginning of the writing process. Besides, if students are aware that texts are organized according to the genre, they may be able to understand their purpose more easily and more appropriately interpret their findings. Genre awareness would have made Laura conscious that she was using the introduction from a different genre – journal article reviews – as a model for her thesis introduction.

All four possibilities of approaches can be scaffolded by a professor that works with disciplinary writing. However, it requires professors to believe that the development of disciplinary writing that addresses the expectation of highly demanding members of the research community does not happen either through focusing, primarily, on the mastering of the structure neither on using genre as formulaic models. It happens from a top-down analysis that, first, view genres as performing social actions in the disciplinary

contexts to a specific rhetorical situation, and then it narrows down to the organizational, structural, and lexical choice that gives shape to the genre.

A final pedagogical implication is drawn from the method of this study, the case study. Bonney (2015), in his study *Case Study Teaching Method Improves Student Performance and Perceptions of Learning Gains*, the case study was a more effective pedagogical approach for students in the medicine major than a teacher-centered approach based on text books. Robeson & King (2017) and McDade (1995) also found that case study helped develop analytical thinking and critical thinking for students in the field of health. Singapore Polytechnic (2018), an educational institution in Singapore (a country often praised by its high level of quality of education), implements the case study as the main pedagogical approach in most major.

To teach writing and learning how to write, case studies can serve as a practice for writing professors/instructors and students. Instead of establishing the same expectation on every student, professors may treat each student as a case study that contains particularities pertaining not only to the individual's nationality but to their past experience with writing. This approach could have been successful had the advisor or writing professor known that Laura learned academic writing based on models. They would have understood Laura's cognitive development in disciplinary writing and scaffolded her to develop one step further toward their expectations. For the student, the case study can also be a metacognitive strategy to be an active agent in their cognitive development. If students are aware of their current status of their cognition and what gaps they present, they can better communicate the areas of development they need more development on. Therefore, each assignment, genre, writing activity would be a case

study whose objective is not to produce a perfect final polished product, but to develop metacognitive skills that move the student one step closer to the expectations of the research community.

Regardless of the approach, this study suggests that cognitive development through writing occurs through an approach that promotes awareness that genres change and can be used as tools rather than restriction, a conception that needs primarily to be developed in educators that work with writing, so they can better scaffold both international and international graduate students on an individual case study approach.

CONCLUSION

This case study suggests that both Brazilian and US universities have writing in the discipline as an initiative to develop student's academic literacy in disciplinary writing. However, this case study also indicates that writing in the disciplines both in Brazil and in the US are still grounded on what Fulkerson (1979) classified as mimetics approach, that is, the teaching of formal logic as a way for students to obtain quality writing. Both countries' institutions have not yet succeeded to make Laura aware that, as Bazerman (2009) claims, genres are dynamic and ideological. This lack of awareness has cost her delay in the development of writing in disciplinary contexts, and it is probably hindering the development of many other international and domestic graduate students. If universities are truly committed to developing writers with highly developed competencies, actions need to be taken toward a literacy that promotes the cognitive development of the students. Other studies show that graduate students with higher development in disciplinary writing are the ones involved in research projects and are as well active members of the research community. Policies in universities and colleges

need to also aim at investing student's research involvement in creating opportunities for social interactions within their research community. Laura's literacy experience in the academia confirms that equation: social interaction > cognition = rhetorical, that means that social interaction shapes cognitive processes and, together, operate as forces that drive her rhetorical decisions. In other words, this case study suggests that social process not only influence but also shape the student cognition until the students internally and appropriate the discourse patterns of their community discourse. However, "social interaction" is the variable that will determine whether the student will simply internalize conventions without being aware of what they do, or they will develop the awareness that conventions can be used as tools and can be changed to achieve different rhetorical purposes. Developing genre awareness and using rhetorical genre conventions as metacognitive tools as suggested by Bazerman (2009) seems to especially important for international students because more often than not their language barrier is seen as an impediment for their participation in the research community. If social interaction is a premise for cognitive development, international students may have been restrained the right to fully develop their cognition until they full-fledged develop their language skills.

An extra piece of evidence that writing is socially dependent is that fact that, even though Laura and I are both L2 writers from Latin-American institutions, we shared different constraints because we interacted with different persons and faced challenges that are particular to our field of studies. Advisors, professors, committee board members had different expectations, which made our writing processes completely diverge. The fact we come from different majors in Brazil, we both bring our beliefs and experience

built upon our interactions with professors, advisor, and other members of our institution that shaped our academic literacy to what it is now.

If Bazerman is correct in his assertion that disciplinary writing fully develops not after but alongside to social interaction, international students will develop their writing when opportunities to interact in the research community are granted by the institutions. For these opportunities be granted, the university policy has to recognize first that language in the academia is highly ideologized, based on strict rhetorical patterns of the western culture and focused on untouchable, unbreakable rules. The use of the student's L1 or the student's "broken English" while developing their language skills can be liberating while students are developing their awareness of the intrinsic flexibility of genres rhetorical features. At no point I defend that students should not learn the conventions of a language and that Laura should write her introduction without commitment to her localized community, but it is plausible to assert that graduate students, as posited by Freire (1987), will have a limited development in disciplinary writing without a pedagogy that frees instead of oppressing their cognition.

This study leaves room for many other inquiries. Further studies are necessary to investigate more Latin-American student in depth connecting their previous academic literacy. Case studies with more Brazilian would be necessary to confirm whether Brazilian higher education teach writing based on model pedagogies or not and also to confirm how Brazilian student transition to US higher education since the tendency, in the long run, is that Brazilian students are looking more and more for US institution for master and doctoral degree.

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APPENDIX A

Laura's final draft of thesis introductory section after ten months

Light is the most important environmental signal and the primary source of photosynthetic energy for plants (Bian, 2014). Consequently, the entire life cycle of plants is strongly influenced by a continuously changing light environment (Kami et al., 2010).

Factors such as local weather, climate, latitude, longitude, elevation, magnitude of day length variable, seasons or position of the plant in the community directly alter quality, intensity, direction and duration of light available for plants (Patel et al., 2017). Therefore, plant photoreceptors continuously sense and respond to those fluctuating light conditions and modulate plant growth and development accordingly (Fiorucci and Fankhauser, 2017).

Light signals are perceived by specialized information-transducing photoreceptors which include the red (R) and far-red (FR) light-absorbing phytochromes and the blue/UV-A light-absorbing cryptochromes and phototropins (Franklin, 2008). The interaction between different classes of photoreceptors that are sensitive to particular wavelengths and their downstream signaling pathways mediate both adaptive responses, such as phototropism, and developmental transitions, such germination and flowering (Kami et al., 2010; Diercka et al. 2017).

The ability of plants to detect variations of light intensity, quality or periodicity provides the seed with information it requires about its environment (Fenner and Thompson, 2010); determining where and when germination takes place, which is an essential mechanism for seed survival (Chanyenga et al., 2012).

Chances of successful seed establishment may be determined by whether the germinating seed is buried in the soil or is on the its surface: if it is buried, then the precise depth is crucial for emergence; if it is on the surface, then the degree of shade (especially from surrounding vegetation) may be decisive. Large-seeded seedlings may emerge successfully from much greater depth than light can penetrate, small-seeded seedlings usually may not; consequently, it is more likely for small-seeded species to have light as a requirement for germination than for large-seeded species (Milberg et al., 2000). However, certain families such as the Fabaceae and Poaceae tend to germinate readily in the dark regardless of seed size, while seeds of Cyperaceae and Asteraceae are mostly light-requiring (Ferner and Thompson, 2005).

Light requirements for seed germination are different among different species (Bewley et al., 2013) and are also often assumed to be adaptations to the particular habitats where the species occur (Meyer et al., 1990). Therefore, the understanding of those requirements might be useful in aspects of conservation and management of species (Chanyenga et al., 2012; Zhang et al., 2017).

Throughout vegetative development, plants have evolved many mechanisms in response to the various light environments including increase in stem extension, changes in leaf size and structure, distribution and number of chloroplasts, and refining photosynthetic and respiratory metabolism (Zhang et al., 2003).

Light as a resource in numerous ecosystems is limited and plants have evolved mechanisms to avoid and to tolerate shade. Many plants present several morphological alterations to escape shaded conditions , these mechanisms are collectively known as the Shade Avoidance Syndrome (SAS). Shade avoidance represents one of the most

important competitive strategies that plants possess, and its effectiveness is undoubtedly a consequence of the multiplicity of responses that are available to the shaded plant. It is initiated by initiated by a single environmental signal, the reduction in the ratio of red (R) to far-red (ER) radiation (i.e. R:ER).

Du et al. (2017) reported that higher light intensity increased height, leaf width, chlorophyll content, and photosynthetic rate compared with a 10% light treatment; on the other hand, it also decreased root-shoot ratio and basal diameter in *Solidago*.

Light is also an important environment signal for timing flowering transition and number of flowers and vigor of fruits (Bäurle and Dean, 2006). Higher light intensity condition correlates well with higher number of flowers and fruits of two species of Liliaceae (Piper, 1989).

Most of the studies on photobiology are about commercial species and little is known about native species of the state of Kansas and its region in the United States of America. Therefore, I am going to analyze the possible physiological responses of four Asteraceae species natives to Kansas to different light intensities, focusing in three phases of their development: germination, vegetative development, and flowering. I will conduct all the experiments in conditions of light, temperature, and humidity at the greenhouse of Fort Hays State University.

My objectives are 1) to investigate the physiological responses to three light intensities of each of the plants during germination, vegetative development, and flowering, and 2) to compare these responses between the species.

My hypothesis are: 1) Higher light intensities will increase germination rates of all species; 2) Higher light intensities will increase height, number of leaves, size of

leaves, and pigment contents during the vegetative development of all of the species; 3) Light will increase photosynthesis rates in four species 4) will increase the number of flowers and fruits; and 4) All four species are very close in habitat and evolutionary history; therefore, their responses will be similar to the three light treatments.

APPENDIX B

Semi-structure interviews

First Interview

Through exploratory questions and analyzing a particular research paper, the first interview aims at understanding the student's experience with writing introductions for Research Papers.

What are the steps you follow to write this introduction? Can you describe to me the steps you took to write this research?

Did you write drafts? How? Where (computer, by hand)?

How do you review your papers?

Do you use the syllabus, assignment instructions?

How do you search for articles?

How do you take notes of the articles? Do you write an annotated bibliography?

What differences between American and Brazilian research article introductions have you noticed?

Has your advisor taught you how to write an introduction? What pieces of advices will, or will you not incorporate into the introduction and why?

Have you found any samples to write your introduction? What information from the samples will or will you not incorporate into the introduction and why?

Have you taken any writing course at FHSU? Why or why not? Has any of the course taught how to write an introduction? What pieces of advice will, or will you not incorporate into the introduction and why?

Have you used the writing center to write your introduction? What pieces of advice will you or will you not incorporate into the introduction and why?

Do you write the first draft in Portuguese or in English?

How do you usually start your text: contextualizing or being objective?

Do you write the introduction before or after the research paper is done?

What is the purpose of the introduction of research papers for you?

Do you write the Literature Review in the introduction or as a separate section? Why?

Do you try to persuade your reader? What strategies do you use? Where do you use?

What information do you usually include in the introduction section of the paper?

Do you see any difference between introductions of RA (Research Articles) from Brazil and from the USA?

Do you have any RA from your undergraduate program written in Portuguese that you feel comfortable sharing with me via email?

Second Interview

After analyzing the text, I will ask questions concerning the rhetorical choices of the text.

In this section, questions may vary according to the rhetorical move observed.

Describe to me the steps you went through to write this introduction.

What was the most challenging step / part of the introduction?

Did you change the positions of the paragraphs many times? What paragraph did you change? Why?

What changes were made by you and what changes were made by

Why did you start the interview with [rhetorical move observed]? Why or why not?

Would you move [rhetorical move observed] to a different part of the introduction? Why or why not?

Would you be willing to make the hypothetical change: eliminating [rhetorical move observed]?

In your introduction in Portuguese, you wrote [rhetorical move observed]. Why did you do differently in your introduction in English?

Third interview

I will look at the paper again and observe the changes made, ask similar questions to the second interview, and I will enquire about changes made since the previous draft. All the questions are just frames for the possible enquiring. I do not intend to perform a mere contrast between Portuguese and English academic introductions in Biology; rather I aim at understanding the reasons for the choices and the differences if there are any. My guess is that the student is going through a period of negotiation between American and Brazilian culture.

What motivated you to make the change in [rhetorical move observed]?

Why did you keep the [rhetorical move observed] as before?

Would you consider moving this excerpt to a different part of the introduction?

By looking at your introduction in Portuguese, you [describe the rhetorical move], but you do not do the same in English. Why?

By looking at your introduction in English, you [describe the rhetorical move], but you do not do the same in Portuguese. Why?