Research Paper

EAP Learners as Discourse Analysts: Empowering Emergent Multilingual Students

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Abstract

English for Academic Purposes (EAP) aims to equip multilingual students with the tools to effectively engage in disciplinary academic communication, especially writing. An ongoing challenge is how to transfer students' knowledge of language from the EAP classroom into their current and future disciplines (Monbec, 2018) and how to empower them as independent learners and collaborators in their knowledge development. This paper reports on an EAP curriculum project in which first-year international science students in British Columbia were scaffolded to conduct independent comparative discourse analysis to develop their academic literacy abilities. We demonstrate how students not only improved their understanding of specific language features, but also were empowered with the critical knowledge and skills to become apprentice scholars and active members in the science community. The students were therefore legitimized as academic apprentices, rather than framed as deficient in language or victims of circumstance (Gallagher & Haan, 2017). We therefore present evidence of non-linguist language students successfully conducting independent discourse analysis to further their own language and learning goals.

Introduction

In English for Academic Purposes (EAP), students risk being framed as deficient in language or victims of circumstances (Gallagher & Haan, 2017). However, this view does a disservice to English language learners who are in fact multilingual emerging academic scholars. As such, EAP students are in need of tools to help them navigate the new forms of discourse they encounter and the new forms of writing they must produce. These tools can empower students to understand and use language strategically to position themselves—and understand how others may be positioning them—within academia and beyond. In this way, EAP can help students overcome linguistic and other educational barriers through access to powerful discourse. One tool for achieving this outcome is engaging students in discourse analysis.

Discourse analysis reveals the diversity of language use and its relation to multiple influencing factors, such as the status of the author, the topic under discussion, the purpose of the communication, and the intended audience (Schleppegrell, 2012). While discourse analysis frequently informs explicit instruction in EAP (Basturkmen, 2019; Campion, 2016; Ding &

Bruce, 2017), it tends to be conducted by teachers to shape lesson planning and materials design. At the same time, an ongoing challenge of EAP is how to guide students to be independent learners and co-collaborators in their knowledge development. We argue that supporting them to conduct language analysis on texts and topics of their own interest empowers them as language users and emerging scholars, and to potentially transfer knowledge to new contexts they encounter.

Discourse analysis as a pedagogical tool in EAP classrooms is the focus of this article. We describe and discuss a first-year research writing course refocused on discourse analysis as a research method in order to explore its efficacy as a language learning strategy (as evidenced in the students' writing). The course was part of a first-year program for international students in Canada with embedded EAP instruction based on systemic functional linguistics (SFL) (Halliday & Matthiessen, 2004) and genre-based pedagogies (Martin & Rose, 2008), which focus on language use as patterns of contextualized choices. Students were required to conduct comparative discourse analysis research by investigating language features they had studied and producing a typical academic report based on their study. By conducting analysis themselves, students increased their knowledge and understanding of the features of language and their uses within academic and non-academic genres. Moreover, they were empowered to recognize and use language features, whether SFL or otherwise, within their own writing across disciplines and explore their use outside the language classroom.

This article begins by situating discourse analysis within EAP pedagogy literature, followed by an overview of the context and methodology for the study. We will describe the corpus we collected and present examples from the students' discourse analysis projects to demonstrate how they engaged in individual language analysis that was real and relevant. Finally, we discuss how students in this study were empowered by conducting discourse analysis in various ways. This paper will therefore demonstrate how discourse analysis is an effective pedagogical tool for academic language development, especially for EAP students who are not linguistics students. This study has implications for EAP teaching in British Columbia as well as other EAP contexts in higher education.

Literature Review: Discourse Analysis in Language and Writing Instruction

Discourse analysis involves exploring patterns of language features in a particular body of language (Schleppegrell, 2012) and actively connects language choices to a wider context of language use. Comparative discourse analysis focuses on how language use varies across texts by highlighting how different factors generate or are generated by different language features (Eggins, 2004). Therefore, discourse analysis can be useful in language and literacy education as it explicitly highlights the use of language features in a particular text, genre, or corpus, and contributes to the development of knowledge about language. This is particularly relevant in EAP, where courses may be generalized across the university, streamed to particular fields (e.g., sciences, arts), or targeted to specific disciplinary discourses. Discourse analysis is therefore part of a set of knowledge and research skills required of EAP practitioners in order to teach across or within disciplinary boundaries (BALEAP, 2008; Basturkmen, 2019; Campion, 2016; Ding & Bruce, 2017). Many materials for discourse analysis are thus aimed at the practitioner

(Alexander et al., 2008) and not at the students themselves, who are guided by instructors and teachers, typically in analysis of pre-analyzed texts.

The benefits of discourse analysis for students are well documented in multiple contexts. In K–12 in the United States, discourse analysis applying SFL has been shown to raise critical language awareness in both first and additional language learners (Gebhard, 2019; Moore & Schleppegrell, 2014; O'Hallaron et al., 2015). For EAP in particular, the active engagement in language through deconstruction and analysis of academic texts develops students' ability to read with an eye for writing (Lin, 2016), actively noticing rather than simply comprehending language (Richards, 2006). Rather than just reading for content, discourse analysis requires students to focus on specific language features that are present (or absent) for specific purposes. Understanding why these language features have been used requires contextualization by making explicit the purposes of the texts (genre), the specific contexts they engage with and signal (register), as well as the substantive topic of those texts, and learning that these can be manipulated (Machin & Mayr, 2012) and can be connected to power (Chun, 2015; Fairclough, 2001; Weninger & Kan, 2012). There are limited studies on academic language socialization for international students in EAP courses (Duff & Anderson, 2015). One of few studies found of students applying discourse analysis is Cheng's (2007) case study of a single student writing three versions of an introduction section for different audiences. This study demonstrated learners' awareness and justifications for language choices and text structure according to genre-based pedagogy. This knowledge about language gives students tools to grapple with new contexts in their future studies and careers (Monbec, 2018). Advanced language learners encounter increasingly overlapping aspects of learning language, learning through language, and learning about language (Ferreira & Zappa-Hollman, 2019; Matthiessen, 2006), and it is this learning about language, or knowledge about language, that is a key aspect for EAP learners to develop in order to fully participate in their academic disciplinary community.

Comparative discourse analysis in particular exposes students to different genres of writing, thus making explicit not only what is present but, equally important, what is and is not appropriate in academic writing. English as an additional language (EAL) students are rarely exposed to varieties of English genres to the same extent as their native speaker counterparts (Macalister, 2008). Thus, EAP classrooms can provide an opportunity for extensive reading which benefits students' development of academic skills as well as broader English language skills. Scientists who are non-native English speakers "need to read textbooks or research articles published in English, and many wish to publish in English themselves" (Bloor & Bloor, 2013, p. 223). Therefore, science students in particular (as with those students in the present study) can benefit from exposure to English genres—both academic and for a general audience—in order to participate fully and with more confidence in the scientific community, within and beyond academia.

There are multiple recommendations in literature that students are capable of conducting discourse analysis themselves. Indeed, Thompson (2001) and Moore (2007) advocated that such student discourse analyses do not need to be complex, but instead can be focused on limited features or texts to still gain greater understanding of language use. Such a task is beneficial for students to increase their language ability, understand the content more thoroughly, and transfer what they learn within an EAP classroom to new contexts (Monbec, 2018). Further, Cheng

(2007) highlighted a need to explore connections between students' analysis of language features and their subsequent writing performance. Nevertheless, descriptions of students conducting original discourse analysis in general, let alone for language learning purposes, are remarkably absent in the literature. It is in this gap that we situate our study.

Context

This course is offered in a university program in British Columbia which extends entry into first-year university courses to multilingual students who do not fully meet the language proficiency requirements and therefore need additional language instruction. The program runs simultaneously with students' first-year courses in their specific disciplines, and through a pedagogical approach that draws on SFL (see Ferreira & Zappa-Hollman, 2019 for a description of this approach). The discourse analysis focus discussed in this article was implemented in an academic research-writing course in the science stream in term two of the three-term program, following an initial academic writing course in term one.

The overall goal of the course is to develop students' skills for designing, conducting and reporting on a small research project in the appropriate academic register. It builds on students' linguistic knowledge from the corresponding academic-writing course in the first term, which included academic genres and stages typically encountered in science disciplines and the metalanguage of systemic functional grammar. The specific learning objectives of the course focused on the ability to identify features of academic and professional writing, understand how language choices are related to the context of a text, such as audience and purpose, and apply that understanding in their own language choices.

It was only after designing and developing this curriculum that the authors of this paper recognized the importance of this type of pedagogy for EAP contexts. We decided to conduct a study on the use of discourse analysis by students in the EAP classroom and began to retrospectively collect the data. Ethical approval was obtained in 2019 and emails were sent to past students to seek their consent to their previously submitted writing being included in the study. Students' grades were not affected as consent was given after the course had finished.

The students' research projects examined how one or two specific language features were used differently in two types of texts and interpreted the reason for and effect of those differences. The analysis involved a quantitative comparison of the use of specific language features across texts, and an analysis of the patterns noticed in the form of a data commentary. The types of language features selected and comparisons performed by the students are described below. The assessments for the course involved drafts of each section and a 1500-word final research report following an Introduction, Methods, Results, Discussion (IMRD) structure and a reflective presentation. The students received guidance on their analyses during in-class workshops and tutorials. However, as the goal for this course was not to create technically accurate linguists but language-empowered students within their own disciplines, the students were not assessed on the analyses themselves, but on their ability to write about them using academic genres and language.

Methodology

A corpus of student projects was built in 2019 and again in 2020. A total of 36 students from the classes of the three investigators of this project consented to participate in the study. These students were aged 18–20 and had achieved IELTS 5.5. The total corpus of texts was formed from the final research reports of these 36 students and each of the drafts of the four sections of the research report (n=180).

The initial analysis of these data consisted of collating the language features the students chose to investigate and the text types they chose to compare. We then selected specific language features that were both popular choices among the students and relevant to academic writing in the sciences and grouped them according to metafunction. Students' texts investigating these language features were analyzed for their conclusions about the use of these language features in different genres. For this reason, the discussion sections of student texts were chosen as relevant examples in this paper. In addition, student presentation PowerPoints were included as they contained reflections on their process during this research project.
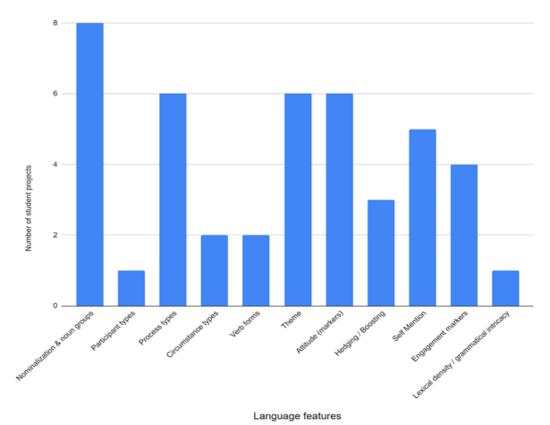
Findings: Student Discourse Analysis Projects

The corpus of 36 student projects provides insight into the value of discourse analysis for multilingual language learners and how it can empower students. The students were able to select the disciplines and topics they studied, the language features they worked on, and what types of texts they compared. This reflects both the concepts they were familiar with from the preceding writing course as well as which language features and texts they were interested in.

The most popular language features across the corpus were nominalization and noun groups (*n*=8), with significant focus on Attitude (markers), Theme (types and patterns), and process types (*n*=6), as shown in Figure 1. It should be noted that as a few of the studies compared multiple language features, the total in Figure 1 is greater than the number of projects in the corpus (*n*=36). Nominalization (the process of turning verbs and adjectives into nouns), Theme patterns (the connections made between content in clauses), and process types (functions of verbs) have been shown by linguistic research to be important in science (Halliday, 2004; Lin, 2016), and indeed were topics emphasized in both the preceding writing course and in this particular course as being key features of academic language. However, Attitude, which focuses on evaluative language (Martin & White, 2005), is not significantly analyzed in research into scientific language, and had not been a major point of instruction in the students' classes, so it is somewhat surprising that so many students chose this for investigation. We shall hypothesize that this interest in interpersonal positioning and evaluative language was due to students' awareness that this was an important area for their language development. In the following sections we explore each of these focal language features to examine why they were a valid choice, what the students found in their own research, and how that may have benefited their own writing.

Figure 1

Focal Language Features in Student Projects

Given the research methodology was comparative discourse analysis, the type of comparison chosen was also a key feature of the corpus, revealing the types of texts students thought were valued and were interested in themselves. Table 1 displays the main comparison for the texts, although often the projects involved multiple variables for comparison. For example, the most common comparison project was to compare a journal article with a TED Talk (*n*=9). The differences in language feature use observed could therefore be explained as a difference of mode (written versus spoken), audience (expert versus general public), and purpose (informative versus informative and entertaining). This selection potentially helped students not only confirm for themselves what they had learned about academic writing, but also understand how often the same experts adapted their language in a highly successful format for the general public. Similarly, comparisons of journal articles with web articles and general audience multimedia (podcast, educational video, popular science video) suggested an interest in how both audiences and modes played a role in language use. Another group of comparisons involved comparing journal articles, whether with other forms of writing (textbook, Wikipedia entry), across disciplines, across languages, or across time, or even sections within those articles. This focus again legitimized students' lessons by having them conduct the analysis themselves, understand enough literature to discuss their findings, and rationalize the use due to the specifics of their data.

Table 1

Types of Comparisons in Corpus

Main Comparisons	Tally
Journal article vs TED Talk	9
Journal article vs web article	7
IMRD sections within articles	4
Journal article vs general audience multimedia	3
Journal article vs textbook	3
Academic expert speaking to different audiences	2
Different use of two language features	2
Disciplinary journal articles (chemistry vs computer science)	1
Journal articles in different languages (Chinese vs English)	1
Food guides in different languages (Chinese vs Canadian English)	1
Journal article vs Wikipedia entry	1
Journal articles across time periods	1
Lecture vs textbook	1

By allowing for an independent selection of both language features and texts for comparison, students were scaffolded to extend their learning from the EAP classroom to different topics, different texts, and different text types, potentially enabling transfer of knowledge and encouraging students to see language as reproducible and predictable patterns which can be variously followed or defied.

Studies of Language Features

In this section, we present examples of the students' discourse analysis projects according to the language features they investigated, focusing both on those most popular in our corpus, and those established as significant in science (Halliday & Martin, 1993). The description is organized according to the three concomitant metafunctions of systemic functional grammar. The metafunctions describe the various ways language and grammatical resources relate to meanings; the ideational metafunction construes meanings through a focus on content (what the text is about), the textual metafunction constructs meanings by organizing language (how the text is organized), and the interpersonal metafunction enacts meanings by focusing on relationships between participants (who is involved in what way) (Matthiessen et al., 2010). These metafunctions were explicitly taught to students as part of the introduction to these concepts in the first term.

Ideation

The language of science is characterized by technicality and abstraction, and two key grammatical resources for realizing these characteristics are nominalization, the process by which verbs and adjectives are turned into nouns, and process types, functional categories for verbs (Halliday, 2004). The main process types are relational (defining, for example the verb "to be"), material (acting/doing), verbal (communicating), and mental processes (thinking and feeling). These two features were a prominent teaching point in students' language courses, closely tied with academic writing of different genres in the first term, and then with the sections and stages of writing their own research reports.

Nominalization. By comparing journal articles with TED Talks and web articles, students recognized the high usage of nominalization in academic writing in comparison to other types of genres. While they had learned of nominalizations as a useful feature in scientific language, to fully interpret the results, they needed to explore different ways of classifying and comparing the nominalizations and connect that to contextual features of the texts. One student who compared nominalizations in a journal article and a TED Talk extended their research to identify differences between nominalizations derived from verbs (e.g., argue–argument) and derived from adjectives (e.g., real–reality). Drawing on literature and with scaffolding, this student connected the nominal derivation to particular characteristics: "This research implies that scientific texts prefer using nominalizations derived from verbs to nominalization derived from adjectives since it enables texts to be more conceptual and objective." The main finding of the project connected the usage to the mode (oral/written) and the audience:

> This research result suggests that oral speeches tend to use nominalizations that are not difficult to interpret since those are written for general public, whereas journal articles tend to use nominalizations that are technical and professional because those are written for experts. The result also indicates that nominalizations are used as the method of condensing scientific data.

Thus, the student demonstrated their increased awareness of the use of nominalizations, not only as a countable feature, but the more specific nuanced usage of technical and specialized nominalizations as well as their variations in form. Their conclusion also validated their research by demonstrating an understanding of the actors involved and their potential audiences: "This research is useful for linguists who investigate the difference between scientific speech and journal article and scientists who want to present their findings in front of the general public." Furthermore, this conclusion potentially enables the transfer of knowledge from this project to any form of presentation to the general public that they undertake in the future.

The study of nominalizations by students therefore confirmed the writing advice they had received about the use of nominalizations in scientific language, and also involved deeper exploration of exactly how to identify and classify nominalizations according to form or meaning, and how to connect that usage to the topic and context of the language use.

Processes. A number of students investigated process (verb) types, comparing academic journal articles with textbooks and with general audience texts (web articles and TED Talks), or comparing within sections of articles themselves. This independent research largely confirmed and validated the advice they had received in class: that the use of material processes and relational processes was significant in academic writing, but used differently in academic and pedagogical texts, or between sections of texts.

For example, one student investigated the use of process types in method and discussion sections in journal articles on artificial intelligence. The analysis showed a higher usage of material processes in the method section, and a higher usage of relational processes in the discussion section. In their own discussion section, the student drew significantly on literature to interpret the findings, while, incidentally, implementing those findings by making significant use of relational processes in their writing:

The higher frequency of material processes in the method section which suggests that descriptive language is more important in procedure. [...] Based on Martinez's research, the method section seems to be the most active part in science research articles (Martinez, 2001). The material processes will provide more information and help the readers visualize the procedure. In comparison, the low frequency of material processes in the discussion section displays more conceptual ideas instead of physical activities. The method section is the description of the experimental steps (Martinez, 2003). On the other hand, the frequency of relational processes in the discussion section is higher than the method section, which is opposite to the distribution of material processes. The higher frequency in the discussion section is related to its purpose, because the discussion section is to evaluate the result and address thoughts to audiences which is similar to Martinez's study (2001). The discussion section may be the most controversial and conceptual part (Martinez, 2003).

By associating use of material processes with the activity recount of the methods section, and relational processes with evaluation and hence with more abstract ideas characteristic of discussion sections, the student's writing shows a heightened awareness of variability of register, from more concrete for "visualizing" procedures to more abstract for "conceptualization," according to different genres.

The student was also able to contextualize the differences between their findings and the consulted literature, identifying a gap in study that was referenced:

However, there are more material processes in both discussion (60%) and method sections (77%) while comparing with relational process (38%) & (21%) which is not addressed in Martinez's research. The reason is that Martinez's research is based on physics, biology and social science, and mine is computer science which is a unique subject in science. Journal articles in computer science do not share the same pattern with other science journal articles. In most of the science research articles, the IMRD section is clear, but in computer science, there are only three distinct sections: introduction, result and discussion section, and computer science needs to explain the reason and method for analytic process (Posteguillo, 1999). That is also the reason why there are more material processes than relational processes in both sections.

The student thus demonstrated an awareness of the diversity of scientific disciplines and disciplinary texts. The student may therefore be better prepared to move into their chosen field, or any other, and both meet genre expectations overall and understand specific purposes and variables that may change the language requirements.

In summary, by conducting their own analysis of ideational language such as nominalization and process types, students had the opportunity to confirm and clarify for themselves their importance in science writing. These features are often glossed over by being conflated into a vague "formal language" category at risk of being missed in general English classes although it can actually benefit and empower students in their academic writing. Often students recognize that writing is "more formal" or "more academic," but do not recognize the use of nominalization or have the metalanguage to describe it. Similarly, verbs are often glossed

simply by grammatical agreement or formality levels, but understanding different process types helps connect language use to broader purposes of defining (relational processes) or connecting with audiences (verbal and mental).

Textual

An important aspect of academic writing and scientific writing is information flow—the organization of information and the logical sequencing of ideas (Halliday, 2004)—which can be a challenge for students. One manner in which this is achieved is the organized use of Themes (the beginning of a clause) in patterns. Academic writing features combinations of Theme patterns: linear pattern (repeating the start of a clause in the next), zigzag pattern (using the end of a clause as the start of the next), or derived pattern (ending a clause with a list or category that becomes the Theme of subsequent sentences or sections. It is worth noting that these were the labels used in our context, but different labels are used in various literature sources (see for example Eggins 2004; Humphrey et al., 2012; Thompson, 2014). Students learned about Theme patterns as a major organizational method in their first term, and investigating them across academic and non-academic texts and contexts provided evidence of how and when they are used to present logical, cohesive arguments.

A number of students in the present study chose to focus on the use of Theme patterns across genres. One student found more frequent use of linear patterns in a TED Talk when the speaker was recounting their personal experience, as compared to multiple Theme patterns present in a journal article by the same person for the underlying organization. The student explained that the linear pattern was more useful for maintaining information flow in a spoken text as the audience needs more reminders, while in a written text information flow cues are visible at all times and the text can be re-read numerous times. One consequence of grappling with real language usage, and in particular focusing on function as well as form, was that the students had to explore interconnected purposes of language. In order to explain the use of a linear Theme pattern in the TED Talk, the student explored why those Themes were personal pronouns:

> The data analysis reveals that the methods section of Text A uses significantly more personal pronouns in theme position than Text B, which can be linked to the different points of departure.

> The theme choice in Text A, I and we, are fulfilling almost the whole text, "I grew…", "I figured…", "I gathered…", "I had…", "We got…", "We got…" (cl. 1, 2, 4, 5, 13, 19) and so on. These theme choices are all departing from the author's experience. According to Eggins (2004), in face-to-face conversation, our point of departure is to communicate about ourselves or those messages are connecting with us. In academic writing, the theme choice demands the thematization of abstraction, and the interpersonal connection between the author and readers is less emphasized.

This explanation not only clarified organizational details about the text, but content selection. This student applied this insight in their final research presentation, presenting their methodology section with their slide highlighting the linear Theme pattern they were using in their speech by repeatedly starting each clause with "I."

Another student noted a higher usage of zigzag patterns in the results section of a journal article when compared to the introduction section, which itself included a higher frequency of linear and derivative patterns. This student commented on the different genres of each of the sections within the journal article, thus developing their understanding of language choices related to organization within an academic text. This student highlighted the usefulness of this research: "In particular, it benefits the writing skills for non-native speakers by guiding academic journal article writing."

By identifying the varied use of Theme patterns in different genres, students were developing an awareness of cohesive devices other than conjunctions (which are often a focus in EAL writing lessons). Students began to recognize appropriate moments for the use of repetition, or when other patterns were more suitable.

Interpersonal

Although research shows that academic language in science requires careful positioning of claims and evidence and adoption of stance (Hyland, 2005), within the limits of a research project or EAP course, researchers and teachers tend reasonably to focus on features like nominalization, process types, and Themes and Theme patterns as having more central importance. Indeed, as has been demonstrated above, these are key features in academic scientific writing. However, a significant number of students within our cohort who chose to study language features from the interpersonal metafunction, which deals with the way an author presents opinion and certainty, and constructs relationships with their readers, merits some exploration. Whether students chose more easily identifiable features like self-mention or hedging modal verbs, or analyzing more nuanced language choices like attitude markers, the corpus reveals a number of interesting topics and comparisons, which suggests international students may be eager for further instruction on these topics.

Student discourse analyses that focused on interpersonal positioning drew on two frameworks: Interactional Resources (Hyland, 2005) and Appraisal (Martin & White, 2005). Those focusing on Interactional Resources chose one or two features and compared across time, disciplines, modes, and audiences. Those focusing on hedging and boosting investigated how claims were positioned as certain and reliable, and therefore sometimes challenged students' expectations that scientific academic writing would display only features of high confidence.

Interactional Resources. A number of studies focused on self-mention, perhaps reflecting students' curiosity about the common injunction against their own use of self-mention, although it is far from absent in academic discourse, or alternatively simply because they expected it to be easy to analyze methodologically. Nonetheless, teasing out which personal pronouns were self-mention (I, my, we, our) and which were engagement markers (we, our, you, your) revealed interesting differences. For example, several students found that public speeches, like TED Talks and educational videos, used an inclusive "we" to indicate a shared experience of humanity, and to engage and persuade the audience. By contrast, in articles written for other experts, writers used an exclusive "we" to refer to the research team and claim ownership or responsibility for the actions and conclusions drawn.

Another study grappled with how these particular Interactional Resources contributed to interactivity between speaker and audience (in a TED Talk) and writer and reader (in journal articles). The student framed this audience awareness explicitly in their introduction, writing:

> Although the role of self-mention and engagement is to enhance the interactivity of the article, the interactive experience the author is hoping to provide for a particular reader might be different. Therefore, the research question is: When addressing the academic audience and general public, how do human geographers include themselves with readers and audiences in their language?

Having identified the significantly higher usage of self-mention and engagement markers in the TED Talk than in the journal articles, the student took a further step of identifying what participant roles those instances of self-mention played:

> The Ted talks used a lot of self-mention and engagement markers in order to give the audience a sense of direct interaction and participation; scientists played the role of actors (A type of participants, function: to construe the material world of doing) while conveying their messages. For academic papers, it has a few interactive words, and most of them are sensers (A type of participants, function: to construe and may project the inner world of consciousness).

They therefore identified the difference between scientists talking about what they did (as actors) to a general audience and talking about what they think or understand (as sensers) to an academic audience. This revealed quantitative and qualitative differences for the usage and granted the student insight into not only whether to use the first person in their own writing, but also why, when, and how.

Appraisal. A number of students also chose to analyze evaluative language with the Attitude system from Appraisal, differentiating positive and negative meanings according to emotion (affect), evaluations of people and their behaviour (judgement), or evaluations of objects and ideas (appreciation). This proved a fruitful avenue of study, with students mostly comparing modes and investigating a broad range of objects of study: dissociative identity disorder, vegetarianism, aerogels, and quantum computing. Indeed, O'Hallaron et al. (2015) emphasized the usefulness of Appraisal for critical awareness of science texts. The students' choice also represented an awareness of differences present in discourse with different audiences, such as being more emotive in representing a new technology to general audiences in popular science texts and more restrained in a journal article aimed at other experts.

For example, in a focus on vegetarianism, a student compared a website of a vegetarian association with an article investigating the nutritional benefits of vegetarianism. During the course, they described the choice of topic (vegetarianism) as one that could have interesting features for interpersonal positioning, which was an aspect of language they felt they needed to improve in their own writing. Initially, they anticipated that the discourse around vegetarianism would include judgement of people for following or not following a vegetarian diet, but in fact their findings surprised them. They concluded their project:

This study has investigated the use of different types of attitude adjectives and how they impact the reader in academic and non-academic texts under the same topic. Website articles tend to use attitude adjectives in a more personal and interactive way, establishing ideas that contain particular purpose from the author, while journal articles are more objective and have less interaction with the reader. […] The findings can help explain why a source is appropriate or inappropriate to use in academic writings based on its subjectivity and the interactivity.

Whether or not the students' analysis was technically accurate, undertaking the research raised the students' awareness of how language was used in different contexts for different purposes. Making the connection back to their own context of study and concluding that this language feature can help them select appropriate academic sources shows a deeper language awareness of how language responds to and creates context. This critical language awareness is ultimately one of the major goals of the course: to prepare students to meet their immediate academic course requirements and further equip them for their ongoing studies.

The students' attention to interpersonal positioning therefore revealed a range of insights into how to negotiate different topics, communicate with different audiences, and achieve different purposes. The fact that a significant number of these EAL students chose to focus on interpersonal positioning suggests that this metafunction merits greater focus in EAP classes and more broadly in EAP research, as argued by Thompson (2001) for EAP and similarly by O'Hallaron et al. (2015) for science.

Lexical Density and Grammatical Intricacy

One key feature of academic language that operates across metafunctions is the characteristics of Lexical Density (LD) and Grammatical Intricacy (GI). LD tallies the lexical or content words (as opposed to grammatical or non-content words) as a percentage of the total word count, and GI calculates the average number of clauses per sentence. Academic texts are generally characterized by higher LD (a higher percentage of lexical words) and lower GI (fewer clauses per sentence) (Eggins, 2004; Fang, 2005).

While some students used these quantitative calculations to contextualize the use of other language features, one student focused on these features in the introductions of journal articles and textbooks on the same topic. The two main findings of the analysis, higher LD in research articles as compared with textbooks, and higher GI in textbooks than research articles, are associated with the purpose of specific text types and the audiences the texts address:

This study has revealed that the degree of lexical density and grammatical intricacy significantly depend on the purpose of different scientific writing genres on the same topic in order to address different audiences. Scientific research articles have higher lexical density and lower grammatical intricacy as they normally are aimed towards specialists on specific topics by using more academic language, while textbooks have lower lexical density and higher grammatical intricacy in order to help students understand scientific concepts easily by applying more spoken language.

While not a major focus in the corpus, this highlights the benefit of disciplinary analysis of not only academic texts (e.g., journal articles) but also pedagogical texts (e.g., textbooks). Students can gain an understanding of how language is adjusted in pedagogical texts to suit an audience and can therefore better interpret that language.
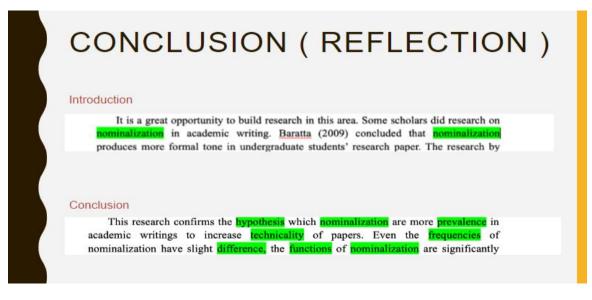
Student Reflection and Feedback

As part of the research project, students were asked to deliver a presentation on their study and findings. This presentation also required self-reflection on the research process, providing insight into students' experiences and perceived benefits of completing discourse analysis research. One student highlighted that as a science student they had never considered language to be important, but by completing this project they discovered that "language is really interesting." Another student mentioned that this project helped them better understand the concepts of SFL learned in Term 1. Other students appreciated the option to choose the science discipline and language feature. Another student recognized the challenge of so much reading, but also that they improved their reading skills and became faster and more proficient by the end of the course. This feedback from students reiterated the benefits of exposure to a variety of texts and genres, developing critical language awareness, and the contribution to students' empowerment.

One student applied their reflection analytically, turning their analysis of nominalization frequency in astronomy onto their own writing. During this student's oral presentation, they compared their own use of nominalizations in their very first draft and the final version of their submitted writing tasks (Image 1), reflecting on their own increased usage over time. Thus, the student was beginning to notice the language used in their own writing, contributing to their critical awareness of language use and how to use it effectively. All in all, these students' reflections are positive indicators of the benefit of science students conducting discourse analysis for the purpose of language learning.

Image 1

PowerPoint Slide from Student's Oral Presentation.

Discussion: Empowering Students with Discourse Analysis

The comparative discourse analysis research projects described above empowered the students to participate in various communities, to develop knowledge and understanding of language as strategic choices, to recognize opportunities to position themselves as social actors, and ultimately to become apprentice scholars. These knowledge and skills benefited and empowered the EAP students in three key ways: students sharpened their critical awareness of language and its functions, developed their ability to analyze texts within and outside academic contexts, and potentially applied this knowledge to their own language use.

Critical Language Awareness

We argue that the explicit focus on language variation across types of texts and the interpretation of linguistic patterns as authors' choices promoted students' development of critical language awareness—a way of actively engaging with a text by interpreting and questioning its production and impact (Hasan, 1996; O'Hallaron et al., 2015; Weninger & Kan, 2012). To this end, functional grammar theory and concepts were valuable tools for noticing, researching, analyzing, and interpreting language. Mediated by functional grammar, the students learned that language is a powerful meaning-making resource and that authors, even in scientific informational texts, make intentional language choices to meet specific purposes as well as genre and register constraints (Halliday & Martin, 1993). In this paper, we have shown that analysis of only one linguistic feature (e.g., nominalization) relevant to science discursive communities, or even an aspect of it (e.g., verb-derived nominalization), provided rich ground for analysis and interpretation at this level. For example, students' close readings and analyses of Attitude in the texts demonstrated that the language of science is not devoid of subjectivity and language choices are made purposefully. Recognizing language as a choice is empowering as students learn to question and resist texts by evaluating linguistic choices and their purpose and impact (Hasan, 1996).

Science communication occurs in many forms and contexts, which are relevant to university students for their learning, sharing research, and general participation in societies. By comparing linguistic choices across different genres, students were exposed to academic language as a set of linguistic registers (Schleppegrell, 2009), rather than a singular academic language, and, thus, were scaffolded towards a nuanced understanding of disciplinary discourses in science.

Transfer to Other Contexts

The immediate goals of the course were to guide students' language development to be capable of meeting the demands of subject content courses in science and the genres valued in this context. Students who chose to study topics relevant to the content courses, such as computer science topics, thus gained some insight into how these disciplines tend to use language. At the same time, students had the freedom to choose other texts and topics they were interested in but not currently studying, such as biology or human geography. They therefore investigated a variety of academic contexts, potentially preparing them for courses they might choose in their

second year and beyond. In this way, the EAP course encouraged them to apply their language awareness to new texts from beyond the immediate context of their first-year program.

These research projects introduced students to a large variety of texts, both academic articles and texts for more general audiences. The students read published journal articles as part of their literature review and analyzed them as objects of study. By reading texts valued in the academy, intended for experts rather than apprentice scholars, students were given access to the types of texts which form high stakes reading (Macalister, 2008). Furthermore, by comparing academic texts with texts for general audiences, such as videos, TED Talks and web articles, they learned to apply their critical linguistic awareness more broadly. This exercise prepared the students to extend their discourse analysis skills to professional contexts and analyze, understand, and question any text. Consequently, the students were being prepared to operate as scientists and English language users talking to a range of audiences, both specialized and general. By choosing and investigating diverse and multimodal texts, students were empowered to participate more fully in academic and non-academic communities. Teaching students discourse analysis therefore empowered students to deconstruct and find patterns in any text, as opposed to simply being taught the organization and discourse patterns of a limited number of genres.

Benefits to Their Own Language Use

When conducting comparative discourse analysis, students began to notice language and understand how it is used, rather than just reading for content. By noticing and identifying language in action in a variety of genres and comparing this language use across texts, students developed a better understanding of how language is structured. Furthermore, they were capable of recognizing how and why language choices were made in specific genres to achieve specific purposes for particular audiences. The ultimate goal of the course was that the students would be equipped with the skill to transfer this developing knowledge to their own writing and be able to make more informed choices of language functions for their own purposes, both academic and otherwise. Whether they achieved this will be the subject of future research.

Discourse analysis therefore empowered these international multilingual students in a number of ways, by providing another avenue to improve their own academic writing in addition to the explicit instruction of the course. In this way, they were enabled to build knowledge for themselves and potentially transfer language knowledge beyond the context of the EAP classroom, into their other topics, future studies, and beyond.

Conclusion

Throughout this paper we have demonstrated that students are capable of conducting discourse analysis projects, specifically first-year international science students in a program with embedded academic English courses. Through this process of comparative discourse analysis, students were simultaneously being apprenticed into research (both conducting research and writing a research report) and developing their understanding of academic writing and science communication more broadly. This complemented and supported the other science courses students undertook in their first-year program, particularly those with a research focus.

Providing opportunities for students to conduct discourse analysis empowered them in numerous ways. Recognizing language use as choices according to genre, purpose, and audience supported the development of critical language awareness. By focusing on one specific language feature in particular contexts, they could gain greater awareness of how to use that language feature more effectively in their own writing—a skill which is transferable to both academic and other contexts. In this way, they were developing the tools needed for successful and appropriate science communication which would allow them to participate more fully in their specific disciplinary communities and the science community in general.

This discourse analysis focus was possible in part due to its position within a program which provided multiple courses and small classes for students, conditions which enabled extensive scaffolding of both metalanguage and analytical technique. Nevertheless, similar projects can be implemented with students in any discipline within higher education and not necessarily limited to international students. English as a first language students also struggle with academic writing and do not necessarily receive (arguably, much needed) explicit instruction on how to write appropriately in academic genres (Hyland, 2008). We argue that this type of explicit instruction and discourse analysis is beneficial to all students entering or currently in academic educational contexts, particularly in British Columbia. Future research will investigate whether engaging in discourse analysis had an effect on students' writing within the course.

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