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Academic language and the quality of written arguments and explanations of Chilean 8th graders

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Abstract Writing is a task that entails high cognitive and linguistic efforts, especially when producing academic texts. Academic language might be one of the factors influencing the quality of written texts, given that prior research has shown its impact on reading comprehension. The purpose of this study is to examine the contribution of Spanish Core Academic Language Skills (S-CALS) and academic vocabulary to the quality of written argumentation and explanation. For this study, 126 Chilean 8th grade students produced an argumentative text and an explanatory text about the same topic. In addition, their academic vocabulary was assessed with the S-AVoc-T test and their CALS with the S-CALS-I test. Results show that both CALS and academic vocabulary are significantly and positively correlated with both writing tasks. Even though these instruments make different contributions to the predictive models in each discursive genre, a Principal Component Analysis revealed that the model that best explains writing quality are those which combine both language variables, namely Spanish Core Academic Language and Vocabulary Skills (S-CALVS). In argumentation, the S-CALVS model explains 29% of the variance, after controlling by gender. In contrast, in explanation, S-CALVS explains 35% of the variance. It is concluded that it is relevant to develop situated writing in each discursive genre and, upon that basis, to work with both CALS and academic vocabulary, because they have a specific impact on academic texts writing.

Keywords Academic language · Academic vocabulary · Writing quality · Writing assessment

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Introduction

Challenges posed by text production tasks that students must address are a persistent problem of writing assessments in school contexts. In the USA, only 33% of 8th graders and 24% of 12th graders perform at a proficient level (Graham & Sandmel, 2011). In Chile, results also show middling performance in 6th graders, although their scores are lower in non-narrative genres: their achievement levels reach 38% when asked to inform and 35% when asked to express their opinion (Agencia de Calidad de la Educación, 2014), which is confirmed by the last tests result, since students show better performance in the narrative genres than in the informative ones (Agencia de Calidad de la Educación, 2017). These results hint at the across-the-board difficulties experienced by students when required to produce quality texts, especially academic genres.

Writing has been researched from various perspectives in order to understand what affects its quality, thus making it possible to orient pedagogical practices in a way that can improve students' written production. In cognitive models, research has focused on the recursive processes of writing such as planning, reviewing, and monitoring (Flower & Hayes, 1981; Hayes, 1996; Scardamalia & Bereiter, 1987). Graham and Sandmel (2011), through a meta-analysis, examined experimental and quasi-experimental studies about writing interventions based on a process approach. As a result, the authors found that this approach was not particularly effective for teaching writing to lower-performing students and did not result in a substantial improvement in writing quality, regardless of the discursive genre. Therefore, the process approach appears to be explicitly overlooking the contextual dimension of writing, both at the level of writer diversity—according to their performance—and of writing as a situated practice.

From a more discursive perspective, other studies have examined factors influencing written production, such as topic knowledge (McCutchen, 2000), regarding which researchers have concluded that lexical and syntactic resources chosen by writers may be restricted by the topic covered. Another relevant aspect is genre knowledge, since several studies have shown that the text quality depends partially on genre knowledge (Beck & Jeffery, 2009; Gillespie, Olinghouse, & Graham, 2013; Olinghouse & Graham, 2009; Verhoeven & van Hell, 2008). Nevertheless, these studies have explored knowledge at a global and structural level (i.e. topic and genre) without examining lexico-grammatical resources as micro-level requirements to produce specific genres. Some studies have focused on the contribution of metalinguistic knowledge on writing quality (Chen & Myhill, 2016; Concha & Paratore, 2011). These researches have shown that writers can make better lexical and syntactic choices when they apply their metalinguistic knowledge to text production; however, they have not assessed the proficiency of lexico-grammatical resources as key skills possessed by writers independently of the use of these skills in writing.

Writing quality as a situated social practice requires paying attention to the requirements laid down by genres, the writer's knowledge of the topic, the specific lexico-grammatical resources involved in the writing task or context, and the level

of language and writing skills possessed by language users. There are more writing requirements in less frequent communicative contexts, with more compact and dense linguistic features and more abstract topics, such as the case of school academic writing. Nowadays, researchers have proposed the term Language for School Literacy Proficiency (LSL-P) (Uccelli, Phillips Galloway, & Qin, in press) to refer to academic activities in school contexts, such as reading and writing, which students are expected to learn in order to express themselves in a flexible way in various communicative situations (Uccelli et al., 2015a). From this perspective, school tasks are not only expected to present linguistic-cognitive challenges for students, but they are also regarded as socioculturally situated discursive practices. That is, students are not only expected to learn the language; they should also become aware of "when, why and with whom to use which language resources" (Uccelli et al., in press, p. 8). Thus, writing becomes a task with a huge potential, because it is materialized when it is socioculturally situated. In other words, the writer is conceived as a user who possesses a repertoire of resources (such as language, genre and knowledge) which have been historically and socially learned across communicative contexts (Bazerman, 2004; Prior, 2009). The present study seeks to contribute to our understanding of writing quality from a situated perspective by working with two academic frequent genres in school setting: the argumentative and the explanatory genre.

That said, writing quality has been measured using rubrics that include various dimensions, such as idea development, text organization, vocabulary and coherence, among others (Beers & Nagy, 2009; McNamara, Crossley, & McCarthy, 2010; Olinghouse & Wilson, 2013). These dimensions, in turn, have been related to different skills. On the one hand, quality has been related to cognitive and motor skills—handwriting fluency, spelling, reading and oral language. There has been found a moderate correlation, since fluency and spelling are important only during writing early development, but not during more advanced stages of school education (Kent & Wanzek, 2016). On the other hand, it was found a weak relation between oral language and writing quality. This was an unexpected result because ideas are developed through oral language, and lexical and grammatical knowledge might also be acquired through this skill (Kent & Wanzek, 2016). Nevertheless, oral language assessment instruments do not necessarily consider specific communicative context requirements such as academic register, but they rather evaluate skills at a general level. Therefore, it might be hypothesized that oral language skills which are specific and relevant for the written genres produced may have a significant correlation with these genres quality.

Prior research has also focused on the impact of specific lexico-grammatical and discursive resources on writing quality. Beers and Nagy (2009) studied 7th and 8th grade students' writing and considered the writer's approach, idea development, effective language use, word choice and tone or voice as dimensions of quality. The results showed that syntactic complexity is related to the quality of texts produced by adolescents, but this relation varies according to the discursive genre and the specific measure of syntactic complexity being used. From a similar perspective, Olinghouse and Wilson (2013) compared the narrative, argumentative and informative genres using a rubric, which assessed idea development, organization,

sentences, word choice and voice. Although the authors analyze how vocabulary predicts text quality, they also conclude that genre knowledge cues word choice as students write.

Several studies have focused on argumentative genre written by first-year university students (Crossley, Muldner, & McNamara, 2016; McNamara et al., 2010; Uccelli, Dobbs, & Scott, 2013). McNamara et al. (2010) found that syntactic complexity, lexical diversity and word frequency predict writing quality. Similarly, the results of Uccelli et al. (2013) show that lexico-grammatical intricacy, length, organizational and epistemic markers significantly predict the quality of written essays produced by last year high school students. Other authors have stated that the text length appears to be the factor most related to writing quality, whereas linguistic rates such as lexical diversity or density and syntactic complexity present contradictory and non-systematic results (Salas, Llauradó, Castillo, Taulé, & Martí, 2016). Nonetheless, Salas et al. (2016) examined different linguistic measures at word, sentence and discourse level and how these related to the writing quality of first person narrations produces by Spanish-speaking students from a range of school grades. Their results indicate that, while productivity is strongly related to quality, this rate is not relevant when linguistic variables (such as vocabulary, syntax and cohesion) are included into the prediction models. Instead, they highlight the fact that teachers tend to assign higher scores to texts with high number of words per nominal phrase, high number of subordinating conjunctions and high lexical diversity. However, these predictions are made based on the linguistic resources used by students in the produced texts rather than measuring them as isolated language skills in order to understand their impact on the produced texts.

In sum, although Kent and Wanzek (2016) meta-analysis reported a low contribution of language skills to writing quality, according to standardized assessment results, and studies on linguistic resources show the impact of language skills on different genres, there is still few evidence about the specific contribution of academic language skills measured in isolation to the quality of writing in different school genres.

Thus, it is relevant to understand the influence of academic language skills on the quality of specific genres, not only as verbal resources but also as a set of resources characterizing a certain context or register. As a consequence, there is a pressing need to further understand the influence of not only a specific verbal resource, but also of a set of resources that define the quality of academic written genres. It is particularly interesting to examine the language of schooling (Schleppegrell, 2004), because that is the context where students need to face multiple registers in order to learn at school (Snow & Uccelli, 2009). The language of schooling or academic language entails the use of academic vocabulary along with a complex and compact syntax, organization markers, and an authoritative voice, among other features (Schleppegrell, 2001, 2004; Snow & Uccelli, 2009). Over the last years, researchers have managed to shed light on the developmental trends of academic language in Chilean and American students between 4th and 8th grade, exploring its contribution to reading comprehension measured as receptive skills with an innovative and education-oriented assessment (Meneses et al., 2017; Uccelli et al., 2015a; Uccelli, Phillips Galloway, Barr, Meneses, & Dobbs, 2015b; Uccelli &

Meneses, 2015). Nonetheless, less attention has been paid to the contribution of academic language regarded as constellations of resources, which operate in writing at a lexico-grammatical and discourse level. In the case of English language, Phillips Galloway and Uccelli (2015) conducted a cross-sectional study and examined the dimensionality of productive academic language skills relevant for learning in school contexts measured in two micro-genres: definition and expository paragraph continuations. The results showed that academic language skills at lexico-grammatical and discourse levels behave differently in each genre and that a two factor model fits the data best. Additionally, models with structural equations showed that, as students progress toward higher education levels, they show greater proficiency in precise lexico-grammatical resources, as well as better global organization at discourse level. Nevertheless, no research has explored so far the prediction of academic language skills in longer school genres and thus there is no evidence of the contribution of Spanish receptive academic language skills to writing quality.

Learning academic language is a necessary first step for students to apply these Core Academic Language Skills to produce academic genres related to their learning process by selecting pertinent and effective linguistic resources. Therefore, the present study seeks to determine whether cross-disciplinary academic language skills and academic vocabulary—measured as receptive skills—predict writing quality in two discursive genres (argumentation and explanation) in Chilean 8th graders.

Academic language

As previously noted, *academic language* is the term used to refer to the language typically used in school (Schleppegrell, 2004), that is, the language of classrooms, textbooks, and tests across disciplines (Uccelli et al., 2015a, b; Uccelli & Meneses, 2015). It includes, for example, abstract vocabulary, complex sentences, and organizational patterns to present information (Uccelli et al., 2015a) and thus transmit and construct knowledge (Snow & Uccelli, 2009).

According to Snow and Uccelli (2009), mastery in academic writing production is defined as the flexible use of a repertoire of lexico-grammatical and discursive forms to organize ideas and express a stance in a variety of textbooks. As a result, "school oral and written texts are expected to be precise, concise, logically connected and reflective, in addition to conforming also to discipline-specific expectations" (Uccelli et al., in press, p. 11).

Prior studies (Meneses et al., 2017; Uccelli et al., 2015a, b) have developed, based on the concept of academic language, an operational construct called Core Academic Language Skills (CALS), defined as "a constellation of the high-utility language skills that correspond to linguistic features that are prevalent in academic discourse across school content areas and infrequent in colloquial conversation" (Uccelli et al., 2015a, p. 338), which go beyond vocabulary (Dobbs, 2014). An assessment instrument called Core Academic Language Skills Instrument (CALS-I) was created to measure the CALS construct in English (Uccelli et al., 2015a, b;

Uccelli & Meneses, 2015). More recently, through a translation and adaptation process, a Spanish version of the instrument (S-CALS-I) was validated (Meneses et al., 2017). This instrument assesses a variety of academic language skills through eight specific tasks for measuring students' proficiency at word, sentence and discourse levels. Studies have shown that CALS-I predicts reading comprehension to a large extent, both in English (Uccelli et al., 2015a, b; Uccelli & Meneses, 2015) and Spanish (Meneses et al., 2017). These instruments have also allowed a more specific comprehension of the contribution of language skills defined from a sociocultural and pragmatic view of language rather than a general view (Uccelli et al., 2015a). Thus, CALS have been measured both in English and Spanish using an instrument which assesses them as receptive skills. However, so far it has not been explored whether CALS-I also can predict writing quality using Spanish data.

Academic vocabulary

The impact of vocabulary on reading comprehension has been extensively researched, especially in early stages (Strasser, Larraín, & Lissi, 2013; Strasser & del Río, 2014). However, very few studies have focused on writing, and these have mostly adopted a perspective centered on language development (Berman, 2004; Berman & Ravid, 2009; Ravid & Tolchinsky, 2002). Less attention has been paid to the influence of vocabulary on writing quality (Dobbs & Kearns, 2016; Gómez, Sotomayor, Bedwell, Dominguez, & Jeldrez, 2016; Olinghouse & Wilson, 2013). Gómez et al. (2016) examined the influence of lexical diversity, density, and sophistication on the quality of narrative, persuasive, and expository texts produced by a sample of Chilean 4th graders. The authors conclude that the different vocabulary measures bear different relations with each discursive genre: lexical diversity predicts the quality of narrative and argumentative texts, lexical sophistication predicts the quality of narrative and expository texts, and lexical density predicts quality in all three discursive genres.

Olinghouse and Wilson (2013) compared the same discursive genres in 5th graders considering multiple vocabulary measures and their relation to writing quality. Their results support the idea that vocabulary measures differ among discursive genres. For instance, in the persuasive genres, content words and register (measured as the proportion of words of Latin origin versus those of Germanic origin) were the only predictors, while in the informative genres content words and sophistication ("maturity") were the strongest predictors. However, the academic vocabulary measured did not predict quality: no variability was observed among the three genres, mainly because they are scarcely used in 5th grade. These results stand in contrast to other studies, which have found evidence for the impact of academic vocabulary on reading comprehension (Lesaux, Kieffer, Kelley, & Harris, 2014; Mancilla-Martínez & Lesaux, 2010). Nevertheless, the influence of this vocabulary on written quality has received little attention (Dobbs & Kearns, 2016) and has yet to be studied in Spanish speakers.

Thus, our first hypothesis is that CALS receptive skills and academic vocabulary have a strong impact on the quality of school genres, which are relevant for

learning. However, this impact would probably be weaker than that on reading comprehension since the receptive proficiency of academic language is not the only factor involved in writing, but also the use of these resources throughout the texts, alongside with other cognitive variables allowing the fulfillment and evaluation of the task.

Discursive genres and writing quality

Research suggests that the notion of genre is always present, either explicitly in theoretical definitions, in the description of the task(s), or implicitly in the results, because the particularities of each discursive genre emerge as prominent features. Thus, the genre knowledge influences all linguistic and discursive domains (Snow & Uccelli, 2009) because the specific lexico-grammatical and discursive resources are aligned with the main purpose of the genre (Beck & Jeffery, 2009; Beers & Nagy, 2009; Danzak, 2011; Olinghouse & Graham, 2009; Verhoeven & van Hell, 2008).

Verhoeven and van Hell (2008) note that each genre imposes its own requirements for organizing the information in knowledge representation. Thus, quality is not regarded as an overarching construct applied to all genres, but, instead, it is understood in a situated manner: it manifests itself through its appropriateness to the social purposes of each genre.

Schleppegrell (2004) describes narrative genres as a personal one; whereas, factual and analytical genres are explanatory and argumentative, respectively. Proficiency in the latter genres occurs later than in narrative genres (Berman & Nir-Sagiv, 2007). Argumentative and explanatory genres are essentially academic and require more specialized language (Olinghouse & Wilson, 2013). The explanatory genres are characterized by a variety of subtypes in which the key objective is to provide general information about the topic discussed, either by describing the phenomena, by explaining how processes occur, or by instructing (Martin & Rose, 2008). In contrast, argumentative genres are aimed at persuading, since authors reflect on a controversial subject and use strategies to gain the audience's support (Álvarez, 2001).

In this study, we decided to work with argumentative and explanatory genres, because writing them demands the deployment of academic language. Three specific dimensions were established for each genre in order to determine the writing quality—knowledge of the genre, idea development and discourse organization. Thus, for the argumentation, we assessed author's stance towards an event, arguments and counterargument, as well as discourse organization (Beers & Nagy, 2009; Gillespie et al., 2013; National Assessment Governing Board, 2010; Snow & Uccelli, 2009). As for the explanation, statement of the phenomenon, idea development and discourse organization were assessed (Beers & Nagy, 2009; Gillespie et al., 2013; National Assessment Governing Board, 2010; Snow & Uccelli, 2009). Hence, quality was measured as a combination of those dimensions and using explicit rubrics, which are explained bellow in this article.

Purpose of this study

The present study examines the contribution of CALS and academic vocabulary to writing quality, specifically to the quality of argumentative and explanatory texts. The participants, 8th graders, produced two writing samples (an essay and a report) about the same topic in order to control for their knowledge about the topic (Kellogg, 1987). Considering the interests of their age, the topic selected for this study was the use of tablet devices. The research questions (RQ) guiding this study are:

RQ1: How do Chilean 8th graders perform in terms of writing quality, Spanish Core Academic Language Skills—measured with S-CALS-I–, and Spanish Cross-disciplinary Academic Vocabulary—measured with S-AVoc-T?

RQ2: Is there a correlation between Spanish Core Academic Language Skills (CALS), academic vocabulary, and the quality of argumentations and explanations?

RQ3: Do Spanish Core Academic Language Skills and academic vocabulary predict the quality of argumentations and explanations?

Methodology

Participants

The sample was composed of 126 eighth graders from three schools located in the city of Santiago, Chile, as shown in Table 1. Given the high level of segregation of the Chilean school system (Valenzuela, Bellei, & De Los Ríos, 2014), the diversity of the sample was ensured by selecting three institutions corresponding to high, middle, and middle-low socioeconomic status (SES) respectively according to a national agency (Agencia de Calidad de la Educación, 2013). The school with high SES was a private school. The second school was a publicly subsidized institution serving students from middle income communities. The third was a public school serving students from middle-low socioeconomic backgrounds. The participants were between 13 and 14 years old.

Procedures

Writing tasks

Two writing tasks were designed to elicit an argumentation and an explanation. The tasks were assessed by experts and tested through several pilot studies. Both tasks covered the same topic in order to control for the participants' knowledge about the subject (Danzak, 2011; Kellogg, 1987). Considering the interests of children, the topic chosen for this study was the use of tablet devices. Prompts were created

Table 1 Socio-demographic characteristics of the participating 8th graders (n = 126)

School SES	n	%	Gender	n	%
High	51	40.5	Female	27	53
			Male	24	47
Middle	40	31.7	Female	18	45
			Male	22	55
Middle-low	35	27.8	Female	17	48.6
			Male	18	51.4

according to Calfee's and Greitz's (2007) recommendations about discursive genre, purpose, audience, and structure.

For the essay, a fictional situation was described—a school conflict regarding the use of tablets in the classroom—and students were asked to deliver their opinion about this situation. In addition, they were asked to support their position with two arguments and one counterargument. Afterwards, they were requested to write an argumentative text aimed at convincing their audience: the readers of a school magazine about technology. Participants were told that the text must include an introduction, one point of view, two arguments, one counterargument, and a conclusion.

To write the report, they were asked to explain the uses and benefits of tablets compared to other electronic devices. Participants received an infographic with pictures and relevant information for generating ideas regarding the use of tablets in everyday life. Afterwards, they were asked to write an explanatory text aimed at presenting the various uses of tablets to an audience who is not familiar with them and wishes to understand their usefulness. They were also reminded that the text must have introductory, development, and closing sections.

Collecting samples

Qualified personnel administered the group tasks in different days. The instruments were administered during school days, with 30 min for each writing task. Genres were written in different orders across classrooms to control for order effects. Afterwards, all the responses collected were digitized. In addition, during other school day, 90 min were assigned for the administration of both instruments for assessing language skills (S-CALS-I and S-AVoc-T). Students and teachers gave their informed consent and school authorities gave their approval.

Scoring samples

A double review process was conducted. The Kappa index was calculated with 20% of the sample in each task, which revealed consistent values ranging from .71 to .91 for the argumentation (.85 on average) and from .91 to 1 for explanation (.97 on average).

Measures

Writing quality

A rubric was generated to measure writing quality in each task by adapting the National Assessment of Educational Progress (NAEP) (National Assessment Governing Board, 2010). The rubric was psychometrically validated (Figueroa, Chandia, & Meneses, 2017), with internal consistency reaching .66. Although the internal consistency indexes obtained are low, values over .6 are considered to be acceptable (Sijtsma, 2009). The specific dimensions assessed in the argumentative genre were stance (POS), arguments (IDEA), counterargument (COUNT), and organization (ORGA). As for the explanatory genre, the dimensions were presentation of the phenomenon (PRESP), idea development (IDE), and organization (ORGE). Each dimension was scored between 1 and 4, which corresponded to four achievement levels (Not Achieved, Basic, Achieved, and Prominent). An evaluation guideline was developed for each task in order to strictly measure what was requested for each dimension. By doing this, researchers did not assessed specific language features such as the use of discourse markers, lexical diversity or syntax and thus avoided assessing the academic language skills measured by CALS-I. Additionally, in order to avoid skewing text revision, texts were transcribed without orthographic errors, since they may influence the revision quality (Kent & Wanzek, 2016). The "Equipercentile equating" method was used, which is based on Classical Test Theory (CTT). This method was used to determine the percentiles of each score, equating the percentiles of the scores in one scale over the other. The maximum score is 16 points.

Spanish Core Academic Language Skills

The Spanish Core Academic Language Skills Instrument (S-CALS-I) ($\alpha = .88$) is a validated translation and functional adaptation of the English version of CALS-I (Uccelli et al., 2015a, b). It is designed to measure high-utility cross-disciplinary academic language skills (Meneses et al., 2017). S-CALS-I includes eight tasks: (1) packing and unpacking nominalizations, (2) organizing compact and complex sentences, (3) connecting ideas logically, (4) tracking participants and themes, (5) interpreting writers' viewpoints, (6) understanding metalinguistic terms (7), organizing analytic texts, and (8) identifying academic register. All items were scored as right or wrong (0/1), except for the organizing analytic text task (0–3). This task was rescaled to be the same weight of the other tasks. The maximum score of the final instrument is 53 (Meneses et al., 2017).

Spanish Academic Vocabulary

The Spanish Academic Vocabulary Test (S-AVoc-T) ($\alpha = .80$) assesses students' knowledge of cross-disciplinary academic vocabulary (e.g. *diversity*, *perspective*) and was adapted from the Word Generation Academic Vocabulary Test of English

Academic Words (Hwang, Lawrence, Mo, & Snow, 2015). For each item, the underlined target word is embedded in a sentence and students are asked to choose the most appropriate synonym among four options. Distractors always include an unrelated word, a phonological associate, and a general semantic associate. All items are scored as right or wrong (0/1) with a maximum score of 15 points (Meneses et al., 2017).

Analytic plan

First, a descriptive analysis was conducted to examine the variability and genre-related differences of all instruments: quality in the argumentation, quality in the explanation, S-CALS-I, and S-AVoc-T. Afterwards, bivariate correlations between both writing tasks and the receptive tests of language skills (S-CALS-I and S-AVoc-T) were conducted. In addition, the analysis included a correlation between both language instruments aggregated into a single one, called Spanish Core Academic Language and Vocabulary Skills (S-CALVS). However, this article does not show the correlations between the dimensions of each rubric, because that is not the focus of the present study.

Afterwards, a multiple linear regression analysis was conducted for each discursive genre in order to examine the specific contribution of S-CALS-I and S-AVoc-T to each task. In the first analyses, the SES variable was incorporated. However, this presented a high correlation with each of the predictors, which implies multicollinearity, affecting the interpretation of each variable (Kraha, Turner, Nimon, Zientek, & Henson, 2012). In fact, performance in each discursive genre improves as SES increases (for details about SES-related differences, see Figueroa, Meneses, & Chandia, 2017). Then, when proposing the regression model, SES itself explained 22% of the variance of the argumentative genre quality and 26% of the explanatory genre quality, as a consequence of the abovementioned structural conditions of the Chilean schooling system. Given that the aim of this study is not to explain the writing quality in relation to SES, we decided to remove that variable from both prediction models. This was calculated with the "lm" function of R's "stats" package (R Core Team, 2017).

Lastly, a Principal Component Analysis (PCA) between the language skills variables (S-CALS-I and S-AVoc-T) was carried out in order to determine the weight of each factor in the regression models for both discursive genres. This was explored using the "principal" function of R's "psych" package (R Core Team, 2017).

Results

RQ 1: Performance in terms of writing quality, academic language (S-CALS-I), and academic vocabulary (S-AVoc-T)

Students reached a basic achievement level in both writing tasks. This means that most of them do not have a good command of neither of the two discursive genres

examined. In argumentation, a basic performance level indicates that students managed to express a personal position about the topic discussed (the use of tablet devices in the classroom) without being able to incorporate another perspective or an alternative point of view. In addition, their texts included underdeveloped arguments and displayed weak organization. As shown in Table 2, the dimensions with the lowest scores are arguments (IDEA) and counterargument (COUNT).

In explanation, a basic performance level indicates that the texts produced displayed only small segments of explanation, because their predominant trait is the description of features and not the explanation of a phenomenon (the use of tablet devices nowadays). Additionally, students scarcely developed their ideas and they organized their texts in an incomplete manner. The lowest-scoring dimension is idea development (IDE). When the scores of both writing tasks were disaggregated by gender, performance in the argumentative genre was found to be similar (females: mean = 8.31, SD = 2.36; males: mean = 7.86, SD = 2.41). However, some differences were observed in the explanatory genre, with female participants scoring higher (mean = 8.82; SD = 3) than males (mean = 7.49; SD = 2.30).

Average S-CALS-I performance reached .35 (SD = 10.38). No differences were observed between females (mean = 37.60; SD = 10.02) and males (mean = 33.86; SD = 10.31). The academic vocabulary instrument (S-AVoc-T) revealed relatively good performances (mean = 10.74; SD = 3.30), with no differences between female (mean = 11.47; SD = 2.93) and male participants (mean = 10.03; SD = 3.53).

RQ 2: Correlations between writing tasks, S-CALS-I, and S-AVoc-T

The correlation analysis showed that, separately, both instruments—S-CALS-I and S-AVoc-T—are significantly and positively correlated with both writing tasks (see Table 3). In fact, total scores in both discursive genres revealed moderate estimates, which suggests that these writing tasks are linked both to academic vocabulary and

Table 2 Descriptive data for the argumentative and explanatory genres, S-CALS-I, and S-AVoc-T (n = 126)

POS = stance, IDEA = arguments, COUNT = counterargument, ORGA = organization, PRESP = presentation of the phenomenon, IDE = idea production, ORGE = organization

	Mean	Achievement (%)	SD	Min	Max
Argumentative genre					
POS	2.21	55.3	.65	1	4
IDEA	1.83	45.8	.71	1	4
COUNT	1.65	41.3	.90	1	4
ORGA	2.38	59.5	1.19	1	4
Total score	8.08	50.5	2.39	4	16
Explanatory genre					
PRESP	2.14	53.5	.77	1	4
IDE	1.91	47.8	.97	1	4
ORGE	2.22	55.5	1.12	1	4
Total score	8.14	50.9	2.74	4	15
S-CALS-I	35.70	67.4	10.38	7	51
S-AVoc-T	10.74	71.6	3.30	0	15

Table 3 Correlations between writing quality dimensions, S-CALS-I, S-AVoc-T, and S-CALVS (n = 126)

	Argumentative genre					Explanatory genre			
	POS	IDEA	COUNT	ORGA	Total score	PRESP	IDE	ORGE	Total score
S-CALS-I	.20*	.31**	.31**	.53**	.53**	.45**	.37**	.48**	.58**
S-AVoc-T	.22*	.37**	.32**	.47*	.52**	.43**	.31**	.45**	.52**
S-CALVS	.21*	.34**	.33**	.54**	.55**	.46**	.37**	.49**	.58**

*$p < .05$; **$p < .01$

to Spanish Core Academic Language Skills. Also, when aggregated into a single instrument through a sum (that is, using S-CALVS), similar correlations were observed. It is important to state that a strong association ($r = .80$, $p < .01$) exists among the instruments used to measure language skills (S-CALS-I and S-AVoc-T), which have been previously validated as a common and underlying higher order factor, namely the Spanish Core Academic Language and Vocabulary Skills (S-CALVS) construct (Meneses et al., 2017). Nevertheless, the aim of this study is to determine the specific association between each instrument and both writing tasks.

RQ 3: Prediction of writing quality

In order to answer the final research question on the factors that account for writing quality, a linear regression analysis was conducted to examine the relation between S-CALS-I, S-AVoc-T, and both writing tasks. Regression models were developed for each discursive genre.

For the argumentative genre, model 1 showed that gender is not significant and therefore not predictive of writing quality. Models 2 and 3 explored the independent contribution of the main predictors—S-CALS-I and S-AVoc-T—in independent models, given their strong correlation. The results of model 2 indicate that Spanish Core Academic Language Skills predict writing quality, explaining 27% of the variance. In contrast, model 3 showed that academic vocabulary explains 26%. However, values calculated for each instrument revealed that both contribute equally, as they displayed the same standardized indexes ($\beta = 53$).

Finally, for model 4, a PCA was conducted including both language skills instruments (S-CALS-I and S-AVoc-T). This revealed a single component to which both instruments contribute equally (.95 each; RMSEA = .02), which explains 90% of the variance. Thus, both the PCA and the sum of both instruments yield the same results. Model 4 showed S-CALVS as the model that best explains the observed variance, reaching 29%; in addition, it displayed the best fit indexes (see Table 4). Therefore, it can be assumed that 29% of written argumentation quality is explained by the receptive knowledge of Core Academic Language Skills and academic vocabulary.

Table 4 Linear prediction model—argumentative genre

	Model 1	Model 2[a]	Model 3[b]	Model 4[c]
Gender	.09	− .00	− .02	− .01
S-CALS-I		.53***		
S-AVoc-T			.53***	
S-CALVS				.55***
Observations	126	126	126	126
R2	.01	.28	.27	.30
Variance explained (Adj R^2)	.00	.27	.26	.29
Change in R^2		.27***	.26***	.29***

For each variable, standardized beta coefficients are reported. The R-squared changes for Models 2, 3, and 4 are reported in relation to Model 1

*$p < .05$; **$p < .01$; ***$p < .001$

[a,b,c]$F (2, 123) = 50.78$, $p < .001$

Table 5 Linear prediction model—explanatory genre

	Model 1	Model 2[a]	Model 3[b]	Model 4[c]
Gender	.24***	.15*	.14*	.13*
S-CALS-I		.55***		
S-AVoc-T			.49***	
S-CALVS				.56***
Observations	126	126	126	126
R^2	.06	.35	.29	.36
Variance explained (Adj R^2)	.05	.34	.28	.35
Change in R^2		.29***	.23***	.30***

For each variable, standardized beta coefficients are reported. The R-squared changes for Models 2, 3, and 4 are reported in relation to Model 1

*$p < .05$; **$p < .01$; ***$p < .001$

[a,b,c]$F (2, 123) = 57.42$, $p < .001$

For explanation, in model 1—unlike for argumentation—the control variable given by gender is significant, since female participants showed a better performance in this task. However, the impact of this variable decreases when it is incorporated into the other models. Indeed, in model 2, Spanish Core Academic Language Skills predicted writing quality, explaining 34% of the variance; in contrast, the indexes of the control variable decreased significantly (see Table 5). In model 3, academic vocabulary only predicts 28%, which shows that both instruments contribute to the model differently. That is, in this discursive genre, Core Academic Language Skills have more predictive power than academic vocabulary in relation to writing.

Finally, after performing the PCA, S-CALVS was also incorporated into model 4 as a single factor (RMSEA = .02). This model provides the best prediction of the quality of explanations, accounting for 35% of the variance and displaying the most robust indexes. Therefore, it can be deduced that 35% of the written explanatory quality is explained by the proficiency in Core Academic Language Skills and academic vocabulary.

Discussion

Academic language and academic vocabulary as predictors of writing quality

In sum, this study yielded three findings in connection with the three questions posed. First, the descriptive data obtained revealed variability in the results of all the instruments administered. Eighth graders students displayed a basic performance level in terms of argumentation and explanation quality. In fact, these results are similar to those obtained through standardized writing tests both in Chile (Agencia de Calidad de la Educación, 2014, 2017) and the US (Graham & Sandmel, 2011). Furthermore, these results are consistent with those of Beers and Nagy (2009), in which no difference in the performance of persuasive and narratives genres was found. Contrastively, regarding academic vocabulary, high levels of receptive knowledge were measured. These results differs from the findings of Olinghouse and Wilson (2013), who did not found any variability in the use of academic vocabulary, although this may be explained by the age of the participants, as the instrument was administered to 5th graders. With regard to S-CALS's domain, the results are similar to those found by Meneses et al. (2017), if we compare the performance of the students of 8th grade.

Regarding the second finding, it was demonstrated that Core Academic Language Skills and academic vocabulary are in fact positively and significantly correlated with both discursive genres. When Spanish Core Academic Language and Vocabulary Skills (S-CALVS) were aggregated, there were similar relations both regarding each dimension of the rubric and the total scores of each task. These findings contrast with Kent and Wanzek (2016) results, as they reported that oral language skills bear little influence upon writing quality, probably because their study assessed skills in a general level rather that situated in the specific knowledge and writing requirements imposed by academic genres. Even though no previous studies have measured receptive language skills of academic language and examined their relation to writing quality, researchers have indeed found positive associations between the lexico-grammatical resources deployed by writers in their texts and writing quality (McNamara et al., 2010; Salas et al., 2016; Uccelli et al., 2013). Likewise, positive associations have been found between discourse measures in texts (organization and stance markers) and writing quality (Dobbs, 2014; Uccelli et al., 2013), although all these studies have focused only on the argumentative genres. As for research on other genres, Phillips Galloway and Uccelli (2015) examined the lexico-grammatical and discourse organization skills in two micro-

genres: definition and expository paragraph continuations. Their results also showed that academic language skills at lexico-grammatical and discourse levels behave differently in each genre and that a two factor model best fits the data.

Finally, the last finding indicates that S-CALS-I and S-AVoc-T predict writing quality separately, although in a different manner depending on the discursive genre considered. In the argumentative genre, Core Academic Language Skills and academic vocabulary make a similar contribution; in contrast, in the explanatory genre, CALS have more predictive power than academic vocabulary when these instruments are independently incorporated into the models. Nevertheless, when both instruments are combined through PCA, reveals that Spanish Core Academic Language and Vocabulary Skills (S-CALVS) can be analyzed as the sum of both instruments. Therefore, both separately and together (S-CALVS), these language skills—Core Academic Language Skills and Academic Vocabulary—can explain writing quality. These results differ from the findings reported by Olinghouse and Wilson (2013), where academic vocabulary measures were not able to predict writing quality in any of the three genres studied (narrative, persuasive, and informative).

However, these results are similar to those found in Dobbs (2014), McNamara et al. (2010), and Uccelli et al. (2013), who report that lexico-grammatical and discursive resources deployed by writers do predict writing quality. Unfortunately, these studies did not compared the behavior of these measures in multiple discursive genres. In turn, the results obtained in the present study suggest that quality can be explained differently for each discursive genre. In fact, in argumentation, S-CALVS only accounts for 29% of the variance, after controlling for gender; contrastively, in explanation, S-CALVS accounts for 35% of the variance, although in this discursive genre students gender also predicts writing quality—yet to a lesser extent when language variables are included in predictive models. Therefore, these results are similar to those reported by Gómez et al. (2016), inasmuch lexical measures assessed (diversity, density, and sophistication) differ among discursive genres, which had also been observed by Olinghouse and Wilson (2013).

Hence, our hypothesis on the impact of CALS receptive skills and academic vocabulary upon relevant school genres quality is proved. Additionally, as expected, prediction power was weaker than when related to reading comprehension (Meneses et al., 2017) because of multiple factors (such as motor, cognitive and metacognitive) influencing text production.

Writing as a situated practice

The lower performance observed in several writing measurements in school contexts may be explained by the fact that predominant cognitive models in language curriculum (Espinosa & Concha, 2015; Graham & Sandmel, 2011)—and, consequently, teaching—focus their attention on global writing processes (e.g. planning and reviewing) while overlooking the linguistic and discursive resources that a written text requires to be effective. Thus, regardless the cognitive model of writing considered, teaching writing needs to address the necessary language skills to produce quality texts.

Yet, writing quality can only be understood as a situated construct based on the communicative purpose of each discursive genre (Tolchinsky & Simó, 2001). From this perspective, every communicative act is linked to the circumstances characterizing its production, such as the restrictions of each genre and the way in which each genre's cultural conventions limit the use of linguistic forms (Schleppegrell, 2004). In this context, school tasks and evaluations demand to know and deploy academic language (Snow & Uccelli, 2009). In consequence, research has proposed the Core Academic Language Skills as a constellation of lexical, grammatical, and discursive elements frequently present in school language (Uccelli & Meneses, 2015). However, until now we only knew CALS's predictive value on reading comprehension (Meneses et al., 2017; Uccelli et al., 2015a, b), but their contribution to writing quality remained unexplored. In this regard, the present study sheds light on the relation between academic language (measured as a receptive isolated language skill) and written production quality in Spanish.

The results obtained reveal differences between the S-CALVS-based predictions for each discursive genre. These differences may be explained in the light of flexible and situated notions of discursive genres used in school (Snow & Uccelli, 2009; Uccelli et al., in press), because writing tasks make evident the continuum ranging from less formal written texts (more colloquial genres, such as e-mails) to properly academic genres (less colloquial, such as scientific explanations).

Thus, in different contexts, the language used can display varying levels of the characteristic features of academic language (Uccelli & Meneses, 2015). Specifically, within the continuum, the argumentative genre task can be characterized as less academic than the explanatory genre task, because the topic (the use of tablet devices in the classroom) is presented as an everyday conflict in the school and thus invites students to adopt a more colloquial register. In contrast, the explanatory genre task probably generated a greater linguistic effort because it required more abstraction and precision in the use of information. These differences can partly account for the varying impact of academic vocabulary and language on each genre.

Likewise, these findings also constitute the limitations of the present study: if the purposes, tasks and topics proposed were changed, results would probably be different. In this regard, the findings presented are limited to 8th graders and to the specific tasks, constructs, and measures included in the study. Therefore, future research in this field should extend the sample to include other school levels. In addition, it is necessary to measure writing quality through other topics and instructions in order to continue understanding the impact of academic language on writing quality.

The second limitation of this study is that students were not allowed to review and rewrite their texts during other school activities nor received feedback in order to enhance their writings. If rewriting were allowed, students would probably incorporate different academic language resources to produce higher quality texts. For this reason, future research may include further writing activities in order to understand whether these resources are effectively used during rewriting and students are able to produce higher quality texts.

Another limitation can also be identified based on these results: if only 29% of argumentation quality and 35% of explanation quality can be accounted for with the

S-CALVS as a predictor, the next step for researchers is to explore the other factors affecting the quality of each discursive genre. For instance, other researchers have concluded that the quality of argumentative genres can be explained, to a great extent, by the level of elaboration and development of ideas (Crossley et al., 2016). However, there is no evidence regarding other discursive genres. As a result, research must focus on learning about multiple predictors in order to improve writing teaching. Only doing so, we can make substantial progress in the writing performance of students in school contexts.

At present, evidence shows that both S-CALS and academic vocabulary have a positive influence on school activities such as reading and writing. Therefore, it is highly advisable to harness these language skills for teaching situated learning activities. In this way, teachers and students can improve their writing skills using academic language as the pedagogical ingredient allowing students to give meaning to their own experiences and even to discuss the ideas of others (Uccelli & Phillips Galloway, in press). Only then they will be able to actually acquire and construct the knowledge they need to engage in dialogue with their culture and their environment.

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