The Language Demands of Analytical Reading and Writing at School

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Abstract

Analytical writing poses particularly challenging, yet often overlooked, language demands that need attention in educational research and practice. In this article, I discuss the Core Analytical Language Skills (CALS) construct and its relevance for school reading and writing. CALS refer to the set of learners' school-relevant language resources that are of high utility to understanding analytical texts across content areas. After a brief review of the relations between mid-adolescents' language and their school reading and writing proficiencies, I offer illustrative examples of individual differences in middle-schoolers' analytical writing and CALS. I argue, on the basis of recent but extensive empirical evidence, that without understanding and addressing the immense variability in the language resources that students bring to school and the language demands of reading- and writing-to-learn tasks and texts, schools run the risk of maintaining and even exacerbating the inequalities that exist in the larger society.

Keywords

argumentation, language, adolescence, middle school, reading, writing

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Why is an article on mid-adolescents' cross-disciplinary language development relevant in a special volume on written disciplinary argumentation? Are individual differences in language development by the middle school years of pedagogical concern? Might mid-adolescents' differences in language development contribute to their school reading and writing? Is this question even relevant for monolingual students, or only for multilingual learners? To engage with these questions, I focus in this article on a novel construct, the Core Analytical Language Skills (CALS), that is, a set of cross-disciplinary language skills that support school literacy, and I synthesize empirical research on the contributions of CALS to reading and writing in multilingual and monolingual mid-adolescents (Grades 4-8). First, I briefly review the documented contribution of CALS to reading comprehension. Then, I review emerging evidence on the relation between CALS and writing proficiencies and I present a few examples of middle-school students' writing to illustrate individual differences and relations across language, reading, and writing proficiencies. I close the article with a discussion of implications for practice.

Before we move into the specifics of what concerns us in this article, though, allow me one digression. I write this review at a moment in which the entire world continues to be affected by the unprecedented covid pandemic. These times have spread unthinkable suffering across the globe and have exposed today's striking inequities within and across countries perhaps more than ever in our lifetimes, while also exacerbating economic, political, racial, environmental, informational, and educational crises. In this historical context of deep human suffering, complex interrelated crises, high tensions, and marked inequities, youth have continued to make their voices heard; have demanded racial, political, economic, health, environmental, and educational equity; and have articulated their dreams for a better world across the globe. It is in the midst of profound despair and exhaustion that an urgent duty to advance meaningful and transformative pedagogical practices faces all of us educational researchers.

As part of the multifaceted response required to attend to today's urgent societal needs across sectors, within the area of classroom instruction, students' argumentation and its counterpart, "deliberative teaching," have gained prominence in research and practice as practices called upon in the transformation of learning environments toward excellence and equity. Recent research syntheses and reports call for disciplinary argumentation, civic reasoning, and discussion as tools to advance students' conceptual learning, but also to prepare them for the much-needed construction of peaceful and inclusive diverse societies (Larrain et al., 2021; Lee et al., 2021). This call for oral and written argumentation about controversial societal issues as a

core practice is not limited to civics education courses, but also heard transversally across disciplines (e.g., literature, history, science). To better inform these practices, recent voices in the field highlight the potential of taking a transversal research approach to examine "deliberative teaching" across different grades and content areas in order to integrate and leverage lessons learned from argumentation-based pedagogies, their actual implementation, their learning outcomes, their possibilities, and their limitations (Larrain et al., 2021). As part of these calls for student argumentation and deliberative teaching, many higher-order skills (e.g., perspective taking, epistemic beliefs), as well as content knowledge, have been identified to be scaffolded throughout the teaching processes and assessed as learning outcomes.

Interestingly and somewhat puzzling, though, language skills are often overlooked in mid-adolescents' argumentation, despite it being obviously a language-mediated practice. At least in part, this might reflect the widespread erroneous assumption that language development is mostly uneventful throughout adolescence, a myth I try to debunk in this article in order to better support argumentation and deliberative teaching throughout the upper and middle-school years. In fact, the claim that language proficiency is essential for skilled writing is so obvious that it often receives little consideration.

Admittedly, writing instruction does pay attention to language, but mostly to how writers organize language resources assumed to be already known. Supporting developing writers in building linguistically cohesive texts, for instance, is not uncommon. We have known from research, from practice, and from experience that linguistic cohesion contributes to texts' quality and that writing cohesive texts is one aspect that continues to improve throughout the school years with practice, feedback, and mentoring. The work I present here highlights that for large proportions of adolescents the task is not only to learn to organize known language building blocks into increasingly cohesive texts (and certainly, to expand disciplinary content knowledge) but, in fact, also to expand their knowledge of high-utility school-relevant language resources. For large proportions of adolescents, the language resources of high utility in analytical texts across content areas are too often unfamiliar. Importantly, this is the case also for many monolingual mid-adolescents who, in the absence of unusual circumstances, are already skilled, fluent, and sophisticated language users and communicators in many other language contexts inside and outside of school.

On the basis of consistent research findings accumulated across multiple studies conducted in different contexts, I argue in this article for the importance of an integrated approach that intentionally and strategically (a) expands high-utility analytical language resources that support reading and writing to learn across content areas and, simultaneously, (b) affirms and

leverages multilingual and multidialectal resources in welcoming schools and classrooms that engage and value students' funds of knowledge and multiple identities (Gutiérrez & Rogoff, 2003; Moll, 2019; Uccelli, 2023). Paying attention to strengths and areas of growth in analytical language as part of affirming and expanding students' larger and flexible language repertoires is a crucial component of designing transformative high-quality and equitable learning opportunities to promote reading- and writing-to-learn across content areas.

Later Language Development

From a sociocultural and pragmatics-based conceptual framework, language is inseparable from social context. Within this framework, the study of language learning requires analysizing how ways of using language vary across contexts, tasks and purposes. Relatedly, the study of reading and writing is understood, at least partially, as an extension of the study of language learning, with new language resources needed as novice readers and writers encounter new written tasks, and purposes with novel pragmatic challenges. Relatedly, oral and written language proficiencies are understood as the result of individuals' socialization and enculturation; in other words, as reflecting their accumulated histories of participation in context-specific ways of using language (Ninio & Snow, 1996; Ochs & Schieffelin, 2017). This view is further enriched by research on language as sociopolitical practices and identities, which highlights that language use and learning are always affected by the particular and complex historico-political circumstances of the immediate and global contexts in which learners construct and experience their language identities (Benson, 2013; Bourdieu, 1991; Cummins, 2014; Gutiérrez & Rogoff, 2003).

If attending to linguistic variation has always been important in education, in today's increasingly diverse school systems and societies it is at the core of achieving educational excellence and equity. Unprecedented waves of national and international migration, as well as the expansion of school enrollment—especially in the Global South—have resulted in educational systems serving more linguistically and culturally diverse populations than ever before. At school, children and adolescents enter an unfamiliar institution, with its own culture and culturally patterned ways of using language. Besides developmental differences, at least three main and interrelated sources of linguistic variability are ubiquitous in language learning and use. First and foremost, cultural differences permeate the ways families, communities, and institutions use language. Cultural differences exist in aspects as varied as which topics of conversation are appropriate, whether interrupting

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a speaker's turn is a sign of rudeness or engagement, or how personal experiences are structured into narratives (Heath, 1983; Ochs & Schieffelin, 2017). Second and relatedly, sociolinguistic differences reflect intersecting social identities of speakers' particular communities (e.g., geographical origin, gender identities, generational membership) (Baugh, 2018). A third source of variability, register (and genre) differences, is manifested in the different and predictable sets of language resources called upon to accomplish specific purposes (e.g., air traffic controllers' register, sportscasters' register, academic writing register) (Biber & Conrad, 2009; Halliday, 2004/2006). All these sources of variability come together in the languages that students, teachers, and curricular texts bring with them to the classroom, with each student having traveled a distinct path and, thus, bringing a unique repertoire of language resources, practices, and identities. Importantly, variability across language users (due to sociocultural and sociolinguistic factors) and across linguistic contexts (due to register, genre, modality) is not exclusive to educational institutions; to the contrary, these sources of variation are intrinsic to language use across settings. While keeping at the forefront all sources of variability in the implications for instruction, here I focus on variability at the intersection of culture and register with the goal of delineating specific language resources called upon for reading and writing to learn at school.

Before I zoom into language, though, it is important to acknowledge that reading and writing to learn, as well as oral and written argumentation, are influenced by many factors beyond language (e.g., motivation, prior knowledge, cognitive strategies). Recent research highlights in particular the crucial role of content knowledge and epistemic beliefs about the structure of knowledge in adolescents' written argumentation and reading comprehension (e.g., Baytelman et al., 2022; O'Reilly et al., 2019). Whereas I call for attention to mid-adolescents' language, I need to clarify upfront that I see expanding students' knowledge to support text understanding and argumentation as crucial and intimately related to language learning. In fact, the most recent research recommends precisely expanding students' knowledge and understanding while scaffolding language learning through active participation in authentic discipline-specific practices (Jones et al., 2019; Uccelli, 2023). Having highlighted the crucial role of expanding knowledge and conceptual understanding, let us return to our focus on language.

Research on language development has focused mostly on the early years with emerging but comparatively scarce research focused on mid-adolescence (Berman, 2009; Nippold, 2007; Townsend & Collins, 2009). The limited developmental linguistics research (mostly focused on cross-sectional and homogeneous samples) shows that adolescence is a period of potentially extensive language growth (Christie & Derewianka, 2008; Nippold & Sun,

2010; Nagy & Townsend, 2012; Schleppegrell, 2004). This work reveals that as individuals grow and enter unfamiliar contexts where new things are done through language, children, youth, and adults continue to learn new language resources to accomplish novel tasks (Berman, 2009; Ninio & Snow, 1996; Ravid & Tolchinsky, 2002).

Extensive and complementary lines of research in textual linguistics and ethnographic literacy reveal that at school students not only learn *to do new things* with language (e.g., learn complex concepts and theories, reason with evidence, explain with precision, analyze texts critically), but that these culturally specific school practices also require learning new language resources. In particular, the learning tasks accomplished through language in secondary school, and consequently the language resources used to accomplish those tasks, vary in systematic and predictable ways from the tasks and the language used in spontaneous interactions outside of school learning or those used in elementary school (Halliday, 2004/2006; Heath, 2012).

Importantly, the register-based differences documented by textual linguistics research across contexts emerge not from prescriptive approaches focused on preserving rigid rules of grammar or standard forms, but instead from descriptions of large corpora of authentic language uses by speakers/ writers engaged in real-world tasks (Berman, 2009; Biber & Conrad, 2009; Halliday, 2004/2006; Heath, 2012; Ravid & Tolchinsky, 2002). Thus, register differences documented in textual linguistics analyses capture the language resources that actual speakers/writers use as they accomplish various pragmatic purposes in real life. These studies have included not only analyses of expert writers and texts but also analyses of curricular materials, assessments, and student work used and produced in real schools and classrooms (Bailey, 2007).

Ethnographic research focused on adolescents' school-relevant languages and literacies documents salient differences between in-school and out-of-school literacy practices. In this work, the same adolescents labeled as "struggling readers" at school have been shown to be engaged in effective and complex reading and writing outside of school. Their reading practices, though, tend to differ from—and be overlooked by—the conventional academic literacies of school (Moje et al., 2000; Skerrett, 2020). Furthermore, Heath's (2012) ethnography, a 30-year follow-up to her 1983 ethnographic study, reveals adolescents' inequitable access to out-of-school learning opportunities that support the development of school-relevant language proficiencies. Heath (2012) documents how some adolescents—typically, but not always, from more privileged environments—have more opportunities to engage in after-school learning activities (e.g., debate clubs, youth urban

theater, environmental science groups), where they participate in inclusive and engaged communities, while learning vocabulary, sentence patterns, and discourse structures that are closer to the written discourses of school texts. Heath found that the language resources expanded through these activities contrasted with the otherwise ubiquitous spontaneous peer talk, which, while sophisticated in turn-taking patterns, irony, and other dimensions, tended to draw from recurrent vocabulary, context-dependent topics, and mostly present-tense sentences (Heath, 2012).

Merging insights from developmental linguistics (e.g., Berman, 2009), sociocultural studies (e.g., Heath, 2012), functional linguistics (e.g., Halliday, 2004/2006; Schleppegrell, 2004), language and literacy relations (Hemphill & Snow, 1998), and studies with multilingual learners (Cummins, 2014), our CALS research seeks to build on this important work by offering, to my knowledge for the first time, an operational definition of a nonexhaustive subset of language skills relevant for reading and writing across content areas. Students' school-relevant language skills have been theorized as important for literacy, studied productively in students' writing, and measured through vocabulary or grammar assessments. The novel contribution of the CALS research is to provide an operational construct that delineates a particular subset of high-utility cross-disciplinary language skills (as part of a much larger construct of language proficiency) and a tool to measure this construct. In this way, this program of research has provided a tool to empirically test the hypothesis that differences in school-relevant language skills (beyond vocabulary knowledge) indeed may help explain mid-adolescents' reading and writing proficiencies (for additional discussion of the theoretical and empirical basis of the CALS construct, please see Barr et al., 2019; Uccelli, 2023; Uccelli et al., 2015; Uccelli, Phillips Galloway, & Qin, 2020).

While a variety of language resources are essential to navigate the multiplicity of contexts that speakers/writers/readers need to navigate inside and outside of school, in this paper I focus on the language that supports reading and writing to learn at school. These resources are not more complex or superior than the language resources students, and we all, typically use in our informal face-to-face conversations. They are just different and context-specific, and because of that we hypothesized they might be challenging.

The CALS Construct

The role played by students' language proficiencies on their comprehension and production of school analytical texts throughout mid-adolescence is only starting to receive attention either in education or research, particularly for monolingual learners. Motivated and informed by textual linguistics

studies on how language varies across tasks, on ethnographic work on adolescents' languages and literacies, and on quantitative studies on the relations between language and reading comprehension, we operationalized the CALS construct and, simultaneously, designed the CALS instrument to investigate empirically if mid-adolescents' knowledge of the language of analytical texts could help explain why so many adolescents struggle with reading comprehension. Analytical texts refer to those focused on analysis, explanation, and argumentation, which are precisely the type of texts that start to become more prevalent and ubiquitous across several content areas around Grade 4 (Schleppegrell, 2004). In this section, I introduce the CALS construct that I have been investigating with my colleagues for more than a decade and I review recent findings from studies in which we have administered the CALS instruments to thousands of mid-adolescents in public schools in the United States (in either English, or Spanish and English in dual-language programs) and in various Latin American countries (in Spanish or Portuguese).

CALS refer to a constellation of learners' resources that correspond to linguistic features prevalent in analytical texts across content areas, yet rare in colloquial conversations (e.g., knowledge of logical markers that connect ideas, such as *nevertheless, consequently*; knowledge of structures that pack dense information, such as nominalizations or embedded clauses; knowledge of structures for organizing argumentative texts). This constellation of resources was hypothesized to support reading across school content areas. The CALS construct includes the interrelated skillsets displayed in Figure 1 (for more information, see Appendix 1; see also Barr et al., 2019; Uccelli & Phillips Galloway, 2017; Uccelli et al., 2015).

Thus, guided by extensive descriptive research on the development of school-relevant language throughout adolescence and its hypothesized contribution to school reading and writing, the CALS construct measures upper-elementary and middle school students' core language resources for reading and writing to learn at school. More specifically, each of the CALS skillsets displayed in Figure 1 includes a range of language resources which, under rich and supportive learning contexts and conditions, upper-elementary and middle-school students develop gradually. The progressive mastery of these analytical language skillsets, in turn, supports students' comprehension and production of increasingly linguistically dense texts across content areas (Cummins, 2016; Berman & Nir-Sagiv, 2007; Christie & Derewianka, 2008; Schleppegrell, 2004).

For more than five years, our interdisciplinary team—including developmental linguists, psychologists, psychometricians, and educators—worked in the development of a theoretically and empirically grounded
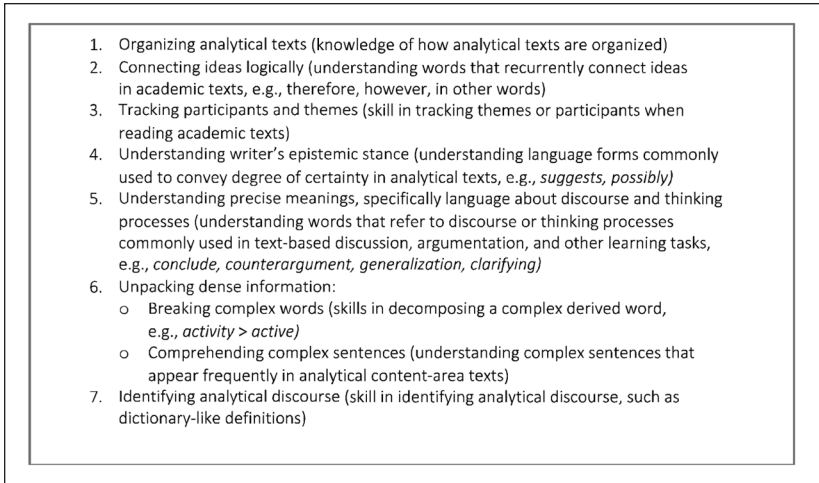
1. Organizing analytical texts (knowledge of how analytical texts are organized)
2. Connecting ideas logically (understanding words that recurrently connect ideas in academic texts, e.g., therefore, however, in other words)
3. Tracking participants and themes (skill in tracking themes or participants when reading academic texts)
4. Understanding writer's epistemic stance (understanding language forms commonly used to convey degree of certainty in analytical texts, e.g., *suggests, possibly*)
5. Understanding precise meanings, specifically language about discourse and thinking processes (understanding words that refer to discourse or thinking processes commonly used in text-based discussion, argumentation, and other learning tasks, e.g., *conclude, counterargument, generalization, clarifying*)
6. Unpacking dense information:
   o Breaking complex words (skills in decomposing a complex derived word, e.g., *activity > active*)
   o Comprehending complex sentences (understanding complex sentences that appear frequently in analytical content-area texts)
7. Identifying analytical discourse (skill in identifying analytical discourse, such as dictionary-like definitions)

Figure 1. Core Analytical Language Skills (CALS) skillsets.

CALS instrument. Through an iterative process of research synthesis, design, field testing with students and teachers, and redesign, the CALS instrument was developed to measure high-utility analytical language skills hypothesized to support reading comprehension across the content areas in Grades 4 through 8. The design of this assessment was motivated by the hypothesis that the variability in the identified set of CALS would be relevant to help explain challenges with reading comprehension not only for multilingual but also for monolingual students in the upper elementary and middle school years.

As a complement to research on academic vocabulary knowledge (e.g., Stahl & Nagy, 2006) and discipline-specific language (e.g., Fang & Schleppegrell, 2008), the main purpose of the CALS instrument is to measure a comprehensive set of high-utility language skills or resources that are relevant across content areas (Uccelli & Phillips Galloway, 2017; Uccelli et al., 2015). The iterative design process unfolded in the following sequence: a task design phase, and pre-pilot study, a series of qualitative and quantitative pilot studies, an expert review panel, and a norming phase (see Barr et al., 2019, for more details). Subsequently and working also with local multidisciplinary teams of linguists, psychologists, psychometricians and educators, the CALS instrument was developed from scratch while using the CALS construct as a guide and the English CALS instrument as a model, in Spanish (S-CALS; Meneses et al., 2017) and in Portuguese (P-CALS; Cardoso & Paulet, 2023). Each language-specific CALS instrument includes tasks, with

varying multiple-choice or short-response formats, to measure the skillsets described above. In addition, because of the lack of measures of academic vocabulary available in Spanish and Portuguese, a subtest of academic vocabulary was included in the S-CALS and the P-CALS.

Language and Reading Relations Throughout Mid-adolescence

In the study of relations between language and reading comprehension throughout adolescence, besides the well-documented contribution of vocabulary knowledge (Stahl & Nagy, 2006), research has investigated the role of morphological and syntactic skills on text comprehension (Crosson et al., 2008; Geva & Farnia, 2012; Kieffer & Lesaux, 2008). This prior research has yielded insightful but not always consistent results. Whereas many empirical studies have found a positive contribution of morphological skills to reading comprehension, controlling for vocabulary and reading fluency (e.g., Kieffer, 2014; Lipka & Siegel, 2012), some have failed to find a similar relation across all groups studied (Nagy et al., 2003). Syntactic skills have found to be predictive of reading comprehension (e.g., Adlof & Catts, 2015; Brimo et al., 2017; Oakhill et al., 2003) and of reading comprehension growth from upper elementary to middle school (Farnia & Geva, 2013). However, Geva and Farnia (2012) found fifth-graders' syntactic skills predicted reading comprehension only for students designated as English learners, but not for English-proficient students. Morphological and syntactic skills have been mostly measured as context-irrelevant constructs with assessments that are not particularly focused on the language resources relevant for school learning.

The CALS is novel in providing a school-relevant and precisely delineated operational construct of language skills of high utility across content areas. Recent studies have found that students' CALS predict reading comprehension in English-speaking students in Grades 4 to 8, above and beyond word-level reading fluency, vocabulary knowledge, and student sociodemographic factors, for students designated as English proficient or English learners (Barr et al., 2019; Phillips Galloway & Uccelli, 2019b; Uccelli et al., 2015). Consistent findings have been reported in studies that examined students' CALS as predictor of reading comprehension in Spanish-speaking samples in multiple Latin American countries, including Chile, Colombia, Mexico, and Perú (Meneses et al., 2017; Romero et al., 2021) and in Portuguese in Brazil. Aligned with prior research conducted in English, these studies on Spanish or Portuguese CALS have found consistently that CALS predict reading comprehension, even when controlling for basic word

recognition skills, vocabulary knowledge, and sociodemographic factors. In other words, these studies suggest that students' difficulties understanding the language of texts help explain their low reading comprehension performances. Paradoxically, precisely the language resources often placed in text to support readers' understanding (e.g., connectives: *consequently*, *in contrast*; stance markers: *likely*, *improbable*) function often as roadblocks for mid-adolescents. Our results advance prior research showing that indeed cohesive linguistic resources (e.g., connectives) are not always helpful for readers. O'Reilly & McNamara (2007), for instance, found that among students with high background knowledge about a text, only skilled comprehenders benefited from a highly cohesive text, while less skilled readers benefited instead from a low-cohesion text. In McNamara and colleagues' studies, however, readers' language skills were not assessed directly; consequently, many possible explanations could be proposed for O'Reilly and McNamara's findings (e.g., lack of attention, disengagement with the text). The CALS results suggest that the less skilled readers may not benefit from more linguistically cohesive texts, not —or not only—because of attentional or motivational factors or cognitive characteristics particular to less skilled comprehenders, but because they may be unfamiliar with the language resources to mark cohesive relations in texts.

Finally, our studies with Spanish/English learners enrolled in dual language programs in the United States—that is, programs that use Spanish and English as languages of instruction in approximately balanced ways—have documented the combined predictive impact of English CALS and Spanish CALS on mid-adolescents' reading comprehension (Aguilar et al., 2020; Phillips Galloway, Uccelli, et al., 2020). Whereas the positive impact of Spanish proficiency has been shown to positively predict English reading comprehension, in prior research once English language measures were added to the predictive models, the impact of Spanish disappeared (e.g., Proctor et al., 2006). To our knowledge, these CALS-based studies with dual language learners show for the first time the independent contribution of both Spanish and English language skillsets (as measured by the CALS instruments) in accounting for the variability in English reading comprehension. This finding aligns with Cummins's (1991) interdependence hypothesis, which proposes that proficiency in one language positively contributes to proficiency in another language. Given the vastness of language proficiency, by delimiting a set of school-relevant language resources, our studies revealed that for learners who experience cross-linguistic register overlap (i.e., they use two languages for the same purposes, specifically, for school literacy and learning), skills in Spanish CALS supported their English reading comprehension, even beyond the contribution of English CALS. Presumably,

knowing specific resources in Spanish can leverage the understanding of unfamiliar resources in English; for example, knowing *en consecuencia* in Spanish can support the understanding of the cognate *in consequence*; knowing how to structure a type of text in Spanish (e.g., a definition, an argumentative text) would support how to structure the same text type, even it is yet to be learned in English. Relatedly, proficiency in the language for reading and writing analytical texts in two languages might lead to a deeper and beneficial metalinguistic understanding of how language works and is organized in text. These results contribute to highlight the value of welcoming and fostering students' full repertoire of language resources and identities in literacy instruction at school (this discussion is beyond the scope of this article, but for more information see Aguilar et al., 2020; ; Phillips Galloway, Uccelli, et al., 2020; Uccelli & Aguilar, 2018; Uccelli, Phillips Galloway, Aguilar, & Allen, 2020).

Given the documented relations between reading and writing proficiencies (Shanahan, 2016) and the obvious need to draw from linguistic knowledge for skilled analytical writing, our next step involved examining the relations between CALS and analytical writing. We turn to this in the next section.

Language and Writing Relations Throughout Mid-adolescence

Given the widely documented individual differences in school-relevant language resources documented by our CALS and reading studies, we asked whether CALS would also be predictive of analytical writing proficiency. Reflecting the overall predominance of research on reading over writing in the field of adolescent literacy, the contributions of mid-adolescents' language proficiencies have so far received more attention in reading than in writing.

Psychological models of writing delineate the cognitive factors involved in writing and, in so doing, acknowledge the essential role played by language proficiencies, yet so far only limited research examines the lexical, syntactic, and discourse skills that support analytical writing throughout adolescence (Alamargot & Fayol, 2009; Kim & Schatschneider, 2017; Peng et al., 2021). Analogous to text comprehension (RAND Reading Study Group, 2002), the generation and organization of ideas in writing involves a multiplicity of writer-level, task-level, and text-level factors. Writer-level factors include topic knowledge, engagement, purpose, and cognitive resources. Task-level factors encompass the sociocultural conditions, including task goal, audience, supports, and constraints. Textual-level factors are

the textual features and other characteristics of the expected written text. Within the large set of cultural and socio-cognitive factors at play (e.g., motivation, topic knowledge), a writer's repertoire of language resources as related to the demands of the task and text is one important factor to consider in mid-adolescents' writing-to-learn.

As discussed above, from pragmatics-based and functional linguistics perspectives, oral and written language development are reciprocal processes that involve learning new ways of using language as speakers/listeners/writers/readers navigate new contexts and tasks (Berman, 2009). In school-relevant writing, development has been described as a gradual mastery of different types of texts (or genres). Specifically, writers progress from learning how to write personal genres (e.g., narratives and recounts), to acquiring proficiency in writing factual genres (procedures and reports), to only later developing proficiency in analytical genres (e.g., analysis, explanations, argumentation) (Schleppegrell, 2004). Extensive developmental linguistics research confirms this trend across multiple languages, documenting that narrative schema is typically acquired by age 9 or 10, while learning to produce analytical texts is a process that unfolds throughout the middle school years and beyond (Berman & Nir-Sagiv, 2007). In writing narratives, writers draw on their extensive practice with oral narratives, which is in fact the first oral discourse children participate in from early on. Additionally, narratives are grounded on a sequence of events, which serves as a concrete scaffold for structuring written narratives. In contrast, writers typically draw from limited oral experiences with analytical texts. Furthermore, compared to written narratives, the cognitive load of structuring an analytical text is higher as writers need to generate their own coherent organization of abstract ideas without a prior supporting structure (Berman & Nir-Sagiv, 2007).

Despite oral and written language being reciprocal processes, though, analytical texts require more than just transcribing oral language if the speaker is to communicate ideas precisely, explicitly, concisely, and coherently to a nonpresent audience. Whereas the field of writing development understands that "writing involves more than transcribing spoken language" (Nokes & De La Paz, 2018, p. 553), oftentimes the discrepancies between producing oral versus written discourse are attributed to developing writers' limitations of working memory, the demands of idea generation, or the higher-order executive processes involved. Without contesting the contribution of all these important factors in text generation, I call for attention in research and practice to the individual differences in mid-adolescents' knowledge of the language resources required to produce precise, concise, and coherent analytical texts.

Most research that examines the contribution of language proficiencies to writing performances has been conducted with second- or world-language learners writing in English. This line of research has identified particular lexico-grammatical measures (e.g., noun phrase sophistication or syntactic complexity) that are significantly and positively associated with students' writing development or the quality of their texts written in English as a second/additional language (e.g., Jo, 2021a; Kyle & Crossley, 2015; Qin & Uccelli, 2020).

The still scarce research on adolescents' writing in their first language has described developmental trends in the production of school-relevant language resources and, to a more limited extent, has documented the contribution of textual linguistic features to the overall writing quality of analytical essays. Textual analysis of students' essays has revealed a gradual increase in the productive language resources that support analytical writing from elementary to high school. Across grades, students display a higher lexical precision, syntactic conciseness, and cohesive connectivity (Berman, 2009; Berman & Nir-Sagiv, 2007; Christie & Derewianka, 2008; Fang & Park, 2020; Schleppegrell, 2004). Aligned with this research, quantitative studies have documented the positive contribution of lexico-grammatical resources (i.e., precise vocabulary; complex words and sentences; use of connectives, such as *in contrast, furthermore)* to analytical writing in middle school (Andreev & Uccelli, 2023; Beers & Nagy, 2011; Deng et al., 2022), high school (Uccelli et al., 2013), and college students (Crossley et al., 2011). For middle schoolers' argumentative writing, in particular, recent research has found that use of adversative connectives was associated with more complex argumentative essays (Taylor et al., 2018). For high schoolers, higher diversity of connectives and a higher frequency of markers of epistemic stance (e.g., *it is probable that; certainly*) have been found to be associated with higher quality of persuasive essays (Uccelli et al., 2013).

Our CALS-focused research seeks to advance the field's understanding of mid-adolescents' school-relevant writing development in a few ways. First, while insightful, prior textual analyses examine only the language resources writers opted to produce in particular texts and, thus, are limited in the inferences to be made about other language resources that the writer may know but just did not display in a particular text. In our work, we address this limitation by concurrently examining productive and receptive language skills. Second, prior studies focus mostly on homogeneous middle-class samples and report average performances. Building on key insights from prior studies, we focus on individual differences in socioeconomically diverse samples that resemble the populations served by urban public schools.

The available emergent research already provides evidence that receptive analytical language skills, as measured by the CALS instrument, are indeed predictive of mid-adolescents' school-relevant writing quality. To date, our research on CALS and writing, however, is more limited than our work on CALS and reading comprehension, which comprises multiple studies with large samples (Uccelli, 2023). That said, receptive CALS have been examined in relation to various school-relevant written genres, including persuasive essays, dictionary-like definitions, scientific summaries, and explanations, in socioeconomically diverse samples. CALS as predictor of writing quality has been examined in samples of English-speaking students attending U.S. public schools (e.g., Andreev & Uccelli, 2023; Deng et al., 2022; Phillips Galloway & Uccelli, 2019a; Phillips Galloway, Qin, et al., 2020; Uccelli et al., 2015), English-as-world-language learners attending school in Korea or China (Jo, 2021b), and Spanish-speaking students attending Chilean public schools (Figueroa et al., 2018). Despite differences in the composition of mid-adolescent samples, the specific research questions examined, and the magnitude of the relations between CALS and writing quality across studies, receptive CALS scores have shown to contribute consistently and positively to the quality of students' writing (as scored by teachers who were blind to the studies' questions).

For English-speaking mid-adolescent writers (Grades 5-8), CALS scores have been found to be positively associated with persuasive essays' writing quality and writers' essay-based syntactic skills (Deng et al., 2022), and found to be predictive of persuasive writing quality, even after accounting for sociodemographic characteristics and essay-based linguistic features (Andreev & Uccelli, 2023). CALS performances were also found to be positively correlated with the production of dictionary-like definitions (Uccelli et al., 2015). For English-speaking mid-adolescents' science summaries, receptive CALS, their comprehension of the source text, and their productive language resources independently predicted the quality of their summaries, even after accounting for students' sociodemographic characteristics and general summary features (i.e., length and copy ratio) (Phillips Galloway & Uccellli, 2019a; Phillips Galloway, Qin, et al., 2020). Moreover, in a longitudinal study, we found that sixth-graders' summary-based diversity of connectives and CALS predicted the quality of their science summaries in seventh grade. For English-as-a-world-language learners (Grades 7-9), receptive CALS emerged as a significant predictor of persuasive essay quality beyond the contribution of essay-based linguistic features and general English proficiency (Jo, 2021b). These results highlight the relevance of the CALS skillset beyond measures of general English proficiency. Finally, in Spanish monolingual eighth graders, Spanish CALS accounted for 29% of

the variance in the quality of their persuasive essays and for an even higher proportion, 35% of the variance, in the quality of their written explanations, controlling for gender (Figueroa et al., 2018).

Overall, despite many pending questions, results already highlight the relevance of cross-disciplinary language skills for supporting independent learners' development and offer some evidence of CALS as a cross-modality construct relevant to both reading and writing at school. In the next section, we offer preliminary data that examine middle school students' CALS in relation to the writing quality of their persuasive essays with the goal of illustrating the contributions of CALS discussed so far.

Individual Differences: Illustrative Examples

In this section, I present written texts produced by four students as illustrative examples of the within- and across-grade variability in writing performances throughout the middle school years. Before moving to the individual examples, I briefly offer a larger context in which to situate these examples.

The four students' texts to be discussed below are part of a larger secondary data analysis project focused on writing development. This project analyzes a database of writing data linked to language and reading assessment data collected from middle schoolers attending urban public schools in the Northeast and Mid-Atlantic regions of the United States. These data were originally collected from students participating in a control group as part of a reading comprehension intervention in a previously funded Reading for Understanding project (Catalyzing Comprehension Through Discussion and Debate, https://ccdd.serpmedia.org/). As part of this database, a cross-sectional socioeconomically diverse and mostly monolingual sample of participating students ($n = 512$; Grades 5-8) completed the following tasks and assessments:

1. Persuasive Essay Writing Quality | iPad Essay: this essay was produced as an on-demand writing task in response to the question *Should iPads be allowed in our classrooms?* (see prompt in Appendix 2). Students' essays were scored using a research-based scoring rubric applied by human raters with extensive educational experience and blind to the study's research question. The 6-point scale rubric of writing quality was estimated after consideration of the following dimensions: the text's argumentative position (i.e., the number of positions the essay considers), the development of ideas (i.e., the degree of depth, elaboration, and connectedness of the ideas presented), the clarity of ideas (i.e., the degree to which the

information is presented in a precise and unambiguous manner), the organization of ideas (i.e., the degree to which the essay is coherently structured). On the basis of 20% of the data (stratified by grade and gender), a high percent agreement was achieved with a Kendall's Coefficient of Concordance for ordinal response of .92 (for a more detailed description of the rubric, see Deng et al., 2022).

2. Reading Comprehension | Global Integrated Scenario-Based Assessment (GISA): a computer-administered and scenario-based reading comprehension assessment that includes literal, inferential, and textual evidence integration questions based on informational/explanatory passages. Research on the GISA assessment has yielded adequate psychometric properties (i.e., internal consistency: alpha reliability = .89; split-half reliability = .76). Scaled scores were used in this analysis (Sabatini et al., 2014).

3. Receptive Analytical Language | CALS Instrument: the CALS instrument was group-administered in its paper-and-pencil format to assess the receptive analytical language resources that support reading comprehension across school content areas. Two vertically equated forms were administered: Form 1 to Grades 5-6 (α = .90) & Form 2 to Grades 7-8 (α = .86). Using Rasch item response theory analysis, factor scores were generated for analysis (Barr et al., 2019; Uccelli et al., 2015).

With the modest goal of situating the individual examples in a slightly larger context, I present descriptive statistics and simple bivariate correlational analysis for students' CALS, reading comprehension assessment scores, persuasive essay writing quality sores, and students' school grades. Table 1 presents means and standard deviations by grade for CALS and Persuasive Essay (PE) Writing Quality for the total cross-sectional sample. Means show an overall upward trend in both receptive analytical language resources (CALS) and persuasive essays' writing quality; standard deviations suggest considerable variability within each grade. Against this larger backdrop of average performances per grade, Table 2 presents the scores from four students whose writing I will discuss below[1]:

- Student 1 (sixth-grade monolingual White boy from higher socioeconomic family background) performed below the sixth-grade averages for both the CALS and the PE writing quality.
- Student 2 (sixth-grade girl from lower socioeconomic family background; race/ethnicity and language background not reported) scored above the eighth-grade averages for both the CALS and the PE writing quality.

Table 1. CALS and Persuasive Essay (PE) Writing Quality Means and SD for Cross-Sectional Sample (*n* = 512).

	CALS	PE writing quality
	Mean (SD)	Mean (SD)
Grade 5	0.68 (1.11)	2.75 (.95)
Grade 6	1.39 (1.28)	3.08 (.96)
Grade 7	1.56 (1.18)	3.24 (1.17)
Grade 8	2.48 (1.27)	3.79 (1.42)

Table 2. Individual CALS and PE Writing Quality Scores for Four Students Across Grades.

	Grade 6		Grade 8	
	Student 1	Student 2	Student 3	Student 4
CALS	1.26	2.57	1.41	5.56
PE writing quality	2	5	2	6

- Student 3 (eighth-grade monolingual White girl from lower socioeconomic family background) performed below the eighth-grade averages for CALS and PE writing quality. In fact, this student performed close to the sixth-grade mean in CALS and below even the fifth-grade mean in PE writing quality.
- Student 4 (eighth-grade monolingual White girl from higher socioeconomic family background) performed more than two standard deviations above the eighth-grade mean in CALS and received the maximum score in PE writing quality in this grade.

Table 3 presents simple pairwise correlations between students' CALS and their reading comprehension scores, PE writing quality, and school grade. Aligned with our prior research, students' CALS were significantly, strongly, and positively related to reading comprehension scores in this sample ($r = .79$; *p* value $< .0001$). Results indicate that students with lower proficiency in receptive analytical language (CALS) tended to exhibit lower reading comprehension performances. The surprising finding is not the obvious need to understand the language of text to comprehend it, but the finding that even by eighth grade many students still struggled to understand many of the most widely used language resources used in analytical texts

Table 3. Pairwise Correlations Between CALS and Reading Comprehension, PE Writing Quality, and Grade (*n* = 512).

	CALS	Reading comprehension	PE writing quality
Reading comprehension	.79***		
PE writing quality	.45***	.41***	
Grade	.41***	.35***	.26***

***p < .0001.

across content areas. Students' CALS were also significantly, moderately, and positively related to their persuasive essays' writing quality (*r* = .45; *p* value < .0001). Consistent with prior research on the positive relation between mid-adolescents' CALS and their science summaries' quality (Phillips Galloway, Qin, et al., 2020; Uccelli et al., 2019), these findings revealed that students with higher receptive knowledge of analytical language resources tended to produce persuasive essays of higher quality. Reading comprehension and PE writing quality also displayed a significant, moderate relation (*r* = .41; *p* value < .0001). Finally, it is worth noticing that CALS scores were more highly correlated than grade to reading comprehension and to PE writing quality. Given the higher variability in the CALS variable (compared to the four-value grade variable), this is not surprising. Yet, these correlations indicate that CALS captured variability relevant to explain reading and writing performances better than just maturational level as indexed by grade.

It is important to highlight here that three of the four students were monolingual English-proficient students (for high-performing Student 2, language information was not available). Whereas differences in multilingual learners have also been documented in our research, it is of the utmost importance to understand that these differences in language proficiencies are relevant also for monolingual students.

Four Students' Writing: Definitions and Persuasive Essays

Two writing tasks, a definition task and a persuasive essay, written by each of the four students introduced above are presented and analyzed briefly in this section to illustrate the within- and across-grade variability in writing performances throughout the middle school years. Both tasks were selected as representing prominent learning tasks used ubiquitously across content areas throughout the middle school years. Analytical, or dictionary-like,

definitions are pedagogical tools regularly used across school content areas to support and assess students' learning of new concepts. Persuasive essays, in which students are expected to defend their positions, start to be introduced consistently in instruction and assessments across several content areas during the middle school years. The expectation is that students will be gradually supported to become skillful writers of argumentative essays in which eventually they go beyond defending their position to supporting a thesis through deliberative reasoning and a rational stance (Nokes & De La Paz, 2018; Toulmin, 2003).

Figures 2 and 3 display these four students' writing: Students 1 and 2 wrote in sixth grade a persuasive essay in response to the situation-based iPad prompt described above and had also completed a Definition Task the year before, in grade 5 (Figure 2). Analogously, Students 3 and 4 wrote in eighth grade a persuasive essay in response to the same iPad prompt and had also completed the Definition Task the year before, in Grade 7 (Figure 3). Both tasks were collected as on-demand independent writing tasks without additional scaffolds or supports for planning or revision. The on-demand nature of these tasks has ecological validity given that on-demand writing is increasingly found in assessments across content areas in school and higher education (Appendix 2 displays the Definitions Task and the PE prompt).

Definition performances. Dictionary-like definitions offer a micro-linguistic genre that calls for salient features of analytical discourse, that is, lexical precision and structural conciseness. The prototypical analytical noun definition consists of two components: a precise superordinate that designates the noun's class (e.g., *a hospital is a* place. . .) and an embedded clause or extended noun phrase that serves to distinguish the defined word from other words that share the same class (e.g., *a hospital is a* place *{in which sick people receive medical treatment}*) (Benelli et al., 2006). In stark contrast with other definition tasks that measure vocabulary knowledge or a supposed underlying verbal aptitude, the definition task administered was designed to request definitions of well-known nouns in order to measure students' language use, in particular their adherence to the expectations of the analytical—or dictionary-like—definitional genre, while reducing the impact of task-specific content knowledge. The task included nouns that varied in level of abstractness as it was expected that defining a concrete noun (i.e., *bicycle*) would pose fewer challenges than defining an abstract noun (i.e., *anger*). Individual differences in definition performances can be described along three dimensions: (a) genre adherence, whether texts display the structure of an analytical definition or not; (b) lexical precision, the

STUDENT 1	
Definitions (Grade 5)	Persuasive Essay (Grade 6)
▪ Bicycle: _something_ with two wheels that you ride. ▪ Anger: _when you get mad._	_Do not take our Ipads. If you do then we will not be able to look at stuff online. Or play games. Everybody will be say. You do not have to take them from all of us. Just take them from the kids that are using them badly._
STUDENT 2	
Definitions (Grade 5)	Persuasive Essay (Grade 6)
▪ Bicycle**:** a bicycle is a _metal object_ with two tires and two pedals to use for **transportation** ▪ Anger**:** anger is a _feeling_ that nobody likes and is good to let go of.	_Should we allow Ipads in our classroom. Yes Ipads should be allowed in our classroom or school. Ipads should be allowed in our school because it benefits students. They can find **information** quicker using the Internet. Another reason why we should get Ipads in our school is because it also benefits teachers. It has notes where they can put all of their lesson plans. Finally we should have to use Ipads is because book bags or backpacks are heavy and can hurt students' back that leads to future back problems. With the Ipads we can leave them in the school. They will not get lost or broken. Also we will not have to carry book bags to school. Just come in and learn. The principal feels that Ipads are to not be used for school purposes because of cyber bullies. People putting mean comments about other people can lead to worse things. I believe she or he should take away an Ipad if mean comments are being said or block all websites that have nothing to do with **learning**._

Figure 2. Definitions and persuasive essays written by students followed from Grade 5 to Grade 6.

Note. underlined expressions = superordinates; **bolded words** = nominalizations; shaded expressions = lexically imprecise terms; boxed expressions = connectives. Not all CALS domains are represented and coded in these examples, but only a selection of the most relevant for distinguishing the texts produced by these developing writers is presented.

presence and specificity of a superordinate; and (c) structural conciseness, the use of extended noun phrases, relative clauses or propositional phrases, and nominalizations to convey information via compact grammatical structures. Below, I describe the four students' performances.

Bicycle | **Defining a concrete noun.** As can be observed in Figures 2 and 3, for _bicycle_ all students followed the organization of an analytical definition genre. Differences are notable, though, in the definitions' lexical precision and structural conciseness. The low lexical precision of the definition produced by Student 1 (Grade 5) stands out in its use of a vague deictic term as superordinate ("something with. . ."). Student 2, a peer in the same grade, produced, instead, a more informative lexical phrase ("a metal object _with_. . ."). In Grade 7, the definitions produced by Students 3 and 4 displayed precise noun phrases as superordinates ("_a_ two-wheeled travelling machine. . ." [sic]; "_a_ form of transportation. . ."). In examining structural conciseness, all students produced extended noun

STUDENT 3	
Definitions (Grade 7)	Persuasive Essay (Grade 8)
▪ Bicycle: a <u>two-wheeled travelling machine</u>. ▪ Anger: when you are really really mad.	*I cannot keep up with class without the Ipad. And the Ipad help kids be responsible and a good thing is I can read and write fan fiction. And if there is a problem with kids using Youtube then shut it off do not let kids use Youtube at school. It cannot be that hard can it plus if you take away Ipads it would be a waste of money.*

STUDENT 4	
Definitions (Grade 7)	Persuasive Essay (Grade 8)
▪ Bicycle**:** a <u>form or **transportation**</u> with two wheels, a set gears and handle bar ▪ Anger**:** a <u>**feeling**</u> of being mad or upset about or over something.	*I think that having school IPads is a positive thing for multiple reasons. First of all they do help students learn and be more efficient in class. You can go online to resources such as dictionaries translators or websites on certain topics students are learning about in school. Next even if students are doing inappropriate things on them or saying bad things about others they would still find a way to do it without the IPads. Also there are many useful and great apps kids can use to their **benefit** of **learning**. These include apps for **presentations, note taking,** math or **math problems studying** and much much more. The principal deciding that IPads are banned and no longer allowed will affect all kids. This is so because of they had been taking important notes for an upcoming test. And they had no way to transfer them or forget to transfer them then they could fail the test or have to read all the notes. Also it would severely impact students who were using the IPads appropriately and were relying on the IPads for certain things like typing documents because they might not have a computer available to them at home. Other things the school community could do to solve the problem is take the IPads away from students using them inappropriately or hurtfully and let the kids keep them that were using it in the right ways. Also the school can request to have certain websites blocked and remove the apps like the App Store or iTunes and other unnecessary or bad apps. Overall the IPads are positive learning tools and problems can be avoided or removed if necessary.*

Figure 3. Definitions and persuasive essays written by students followed from Grade 7 to Grade 8.

Note. underlined expressions = superordinates; **bolded words** = nominalizations; shaded expressions = lexically imprecise terms; boxed expressions = connectives. Not all CALS domains are represented and coded in these examples, but only a selection of the most relevant for distinguishing the texts produced by these developing writers is presented.

phrases to convey their definitions, but only Students 2 and 4 used nominalizations as resources to pack information concisely via a single word (e.g., *transportation*).

Anger | **Defining an abstract noun.** The starker individual differences observed in the definitions of *anger* reveal the new challenges involved in defining abstract nouns. The definitions produced by Student 1 (Grade 5) and Student 3 (Grade 7) present narrative-like descriptions that do not follow the conventional genre structure and include no superordinate (*when you get mad; when you are really really mad*). In contrast, the definitions produced by their peers in their

respective grades fully adhered to the expectations of an analytical definition: a precise superordinate to indicate the class (*a feeling*) and an extended noun phrase with either a relative clause or a prepositional phrase to offer distinguishing information.

Persuasive essay performances. Among the multiple language dimensions in which persuasive essays vary, I focus here only on a selected few: genre adherence, lexical precision, and connectivity across ideas. The prompt asked about a highly familiar topic and context for students with the explicit purpose of minimizing the impact of task-specific content knowledge in order to capture the use of language resources and adherence to the expectations of the analytical essay.

As displayed in Figures 2 and 3, Students 2 and 4 produced not only longer texts but also essays that, for the most part, displayed a persuasive essay structure (writer's position, followed by reasons, and conclusion); were for the most part, lexically precise; and included a variety of discourse and interclausal connectives to explicitly link ideas throughout (e.g., *another reason. . . because. . . finally; first of all. . ., next. . . overall*). Without doubt, these higher performances have plenty of room for improvement (e.g., Student 2 did not include a conclusion; many connectives could be more precise), but they clearly stand out in comparison to the shorter, face-to-face-conversation-like texts (e.g., *Do not take. . .; if you do, then we. . .; plus if you take away. . .*), which displayed several instances of imprecise terms (i.e., *stuff*, *us*, *it*), and a limited range of connectives to link ideas (e.g., *and*, *or*, *if*).[2]

These few examples illustrate two particularly noteworthy trends. The first trend is the within-student consistency across the definition and persuasive essay tasks. In other words, in particular when considering the abstract noun definitions, we observe definitions and essays displaying consistently either a stronger or a weaker alignment to the analytical discourse expectations of genre organization, lexical precision, and structural conciseness, within-student and across grades. Second, striking individual differences across and within grade are observed in this sample of students all attending urban public schools in the US. Whereas one student in the lower middle school grades already produced texts that were lexically precise, structurally concise, explicitly connected, and, overall, closely aligned to the analytical genre organization of definitions and persuasive essays; another student in the upper middle school grades produced performances that did not, for the most part, align with the analytical discourse expectations and did not include language resources to support lexical precision and structural conciseness and connectivity.

I purposefully refer to "writing performances" (not to "students' writing proficiency") given that these texts constitute only single instances of on-demand writing. I refer to the textual features of students' written products, but I cannot claim to have captured a student's full writing proficiency without a more comprehensive writing assessment or portfolio. Furthermore, because this is purely a descriptive analysis, I also purposefully describe individual differences in performances not as necessary indices of students' knowledge, but in terms of "productive use" and "adherence to the expectations" of analytic discourses. As noted above, these students' CALS were aligned with their written performances, though, suggesting, as the correlational analysis reported above indicated, that knowledge of language resources may indeed have played a role in supporting their analytical writing.

Implications for Practice

CALS-based research suggests that paying instructional attention to the analytical language resources that are prevalent in texts across school content areas is important to supporting students to read and write to learn throughout the upper elementary and middle school grades. Does this mean CALS should be taught as set of language skills without context or without any other learning goal but language learning? Emphatically, no. Our own research suggests that CALS are learned together as differentiated aspects of a single unitary construct, presumably as language users participate in analytical discourses in authentic tasks driven by the expansion of knowledge and understanding (Barr et al., 2019; Jones et al., 2019; Uccelli et al., 2015). The minor but important contribution of this work is the evidence it offers for the need to pay attention and to offer strategically designed supports for a set of high-utility language resources. In other words, our findings point to the need to attend to the varying language strengths and needs of mid-adolescent learners, as well as the language demands of particular types of texts and tasks in the context of situated, cognitively demanding but linguistically supported disciplinary practices. The focus on writing instruction throughout adolescence is mostly and understandably disciplinary. It is, in fact, in situated discipline-specific tasks that support conceptual understanding and alongside discipline-specific language resources (Christie & Derewianka, 2008; Fang & Schlepegrell, 2008) that the cross-disciplinary language resources comprised by CALS are best scaffolded to support reading and writing to learn, to construct meaning, and to interrogate the world.

It is important to foreground here, though, that language production, oral and written, extends beyond school-relevant language and involves fluid, hybrid, and dynamic uses of language. Thus, we call for research on language

production that pays attention to the gradual and continuous development of the full repertoires of productive language resources learners develop over time and across writing tasks. Mid-adolescents are creative users of language whose texts call for the careful examination of their full linguistic repertoires, including their appropriations of analytical discourse, their emerging resources, and their creative departures.

Importantly, intervention research has shown that students' CALS are malleable. A discussion-and-debate–based reading comprehension intervention (i.e., *Word Generation*)—which engaged upper elementary and middle schoolers through relevant questions, and scaffolded analytical language orally and in writing—has shown positive impacts on students' CALS, and, in turn, in their reading comprehension levels in Grades 4 to 7 (Jones et al., 2019). Relatedly, analysis of 42 classrooms (Grades 4-7) in which this reading intervention was implemented revealed that classroom discussions characterized by teachers' high dialogic talk (i.e., teacher talk focused on open-ended questions and follow-ups to students' responses that scaffolded extended discussion) positively predicted students' persuasive essay structures (Al-Adeimi & O'Connor, 2021). Aligned with the work of Reznitskaya and colleagues with elementary school students (Reznitskaya & Wilkinson, 2017), this work by Al-Adeimi and O'Connor (2021) shows that teacher-scaffolded discussions of informational topics and texts are also promising to improve mid-adolescents' analytical writing. Engaging with peers offers students access to different perspectives and opportunities to expand their reasoning, knowledge, and language resources to subsequently enrich their writing. More recently, research informed by Spanish CALS has revealed that a science and language intervention called *CLIC* significantly improved fourth-graders' science knowledge, reading comprehension, CALS, and quality of written scientific explanations (Meneses et al., 2018). As shown by definitions of abstract nouns in the illustrative examples above, the expression of increasingly abstract ideas requires new language resources; consequently, attention to equipping all learners with the language resources that support students' new writing, reading, and learning demands in the transition to middle school is of utmost importance for both excellence and equity in literacy and content instruction.

An important pedagogical intent of the CALS is to make the crucial role of students' language resources visible to educators and researchers. Educational Standards across states, as well as the English Language Proficiency Development (EDLP) Frameworks, indeed recognize this need to expand students' school-relevant language resources to support reading and writing throughout the middle school grades. Nevertheless, which language resources are particularly worth scaffolding has remained at best only vaguely defined. The CALS construct offers a conceptual

research-based framework with clearly delineated skillsets to help guide instruction. In our ongoing work with teachers, the range of language skills assessed by the CALS have supported practitioners in a number of ways. First, this construct helps teachers anticipate the language features that students are likely to find challenging in complex texts, and prepare read-alouds and text discussions accordingly. Second, the CALS construct has been helpful in designing lessons that scaffold the students' language resources through mini lessons embedded in situated disciplinary activities that expand language in the service of conceptual learning (e.g., tracking ideas in science texts, expanding the mastery of connectives that highlight conceptual relations). Third, CALS findings expand our understanding of the importance of discussion-based approaches, in which teachers pay attention to scaffold students' ideas to support speaking, reading, and writing to learn as reciprocal processes. Fourth, CALS-based research emphasizes the need of providing students with plenty of opportunities to practice, to analyze texts, and to receive and incorporate feedback repeatedly for each of the analytical genres they are expected to master at school. The overall goal is to make the language resources that support text understanding accessible to students. Otherwise, the resources meant to be helpful function instead as roadblocks for large proportions of students. As a concrete example, our findings could inform anticipating text challenges and including mini lessons focused on language and targeted feedback on language structures across reading and writing in promising disciplinary interventions, such as Historical Writing apprenticeship (Monte-Sano et al., 2017)

An important clarification is in order. Teaching language in school is often conceptualized as teaching conventional grammar aligned with traditional pedagogies that focus on standard forms via students' "corrections" and worksheets, and thus, it is typically perceived as far away from transformative and forward-looking instructional goals and practices. In contrast, I argue here for a reconceptualization of language learning. Instead of purely cognitive skills taught and learned without regard to cultures and sociopolitical contexts, I argue, with many in the field, for the need to conceptualize language learning as the learning of sociocognitive skills always deeply influenced by particular historical-political circumstances and embedded in sociocultural practices and identities (Gutiérrez & Rogoff, 2003; Moll, 2019; Paris, 2021; Uccelli, 2023). For years researchers have been theorizing and conducting empirical studies guided by this broader conceptualization of language, yet research has mostly focused on multilingual learners. The evidence reviewed in this article highlights the relevance of

this reconceptualization for all students and foregrounds that all students are language learners in school in need of support with the new language demands of the learning tasks of the secondary school years. This reconceptualization requires that pedagogies and learning contexts move away from entrenched ways of teaching that too often—even if unintentionally—silence students in order to profoundly reinvent learning environments to promote learning through pedagogies of voices (Uccelli & Boix Mansilla, 2020/2022; Uccelli, 2023). To be clear, this entails not only affirming students' voices and languages, but also paying strategic intentional attention to expanding their language resources. Certainly, a foundational understanding for all instruction is the need to foster engagement and a sense of belonging via educational activities and curricula that affirm students' voices, cultures, identities, and multiple ways of using language. It is by leveraging students' home languages and cultures that we can best expand their appropriation of new language resources. I argue, on the basis of extensive evidence, that paying attention to language resources, in ways that affirm and expand students' voices in school is at the core of transforming educational contexts to be equitable, high-quality, meaningful learning environments.

As I have argued before, without understanding and addressing the immense variability in students' language development, schools run the risk of maintaining inequalities that exist in the larger society: students who learn the language and literacy practices valued at school as part of their regular engagements outside of school will continue to have a better chance of achieving academic success than those who do not have access to such practices (Delpit & Dowdy, 2002; Heath, 2012). Instead of a hidden curriculum, the language used for school learning needs to be part of the explicit school curriculum. I have argued somewhere else that expanding all students' repertoire of analytical language resources as we affirm the value of their out-of-school ways of using language and their full repertoire of language resources flexibly and reflexively is an essential aspect in cultivating the voices of all students (Uccelli, 2023). Scaffolding CALS is not about correcting grammar and teaching standard structures, it is instead about expanding language resources so students can sharpen their own meanings through an extended set of language choices that they can incorporate conventionally if they so wish, but also creatively in standard, nonstandard, or hybrid ways. Metaphorically, expanding language resources should not be about making sure children paint within the lines, but about giving them new colors in their palettes so they can have more options to flexibly express themselves. That said, painters can be masterful with two colors, they do not require a full palette, but a full palette gives them more options.

Appendix I

CALS Construct & Annotated Sample Text

The CALS construct
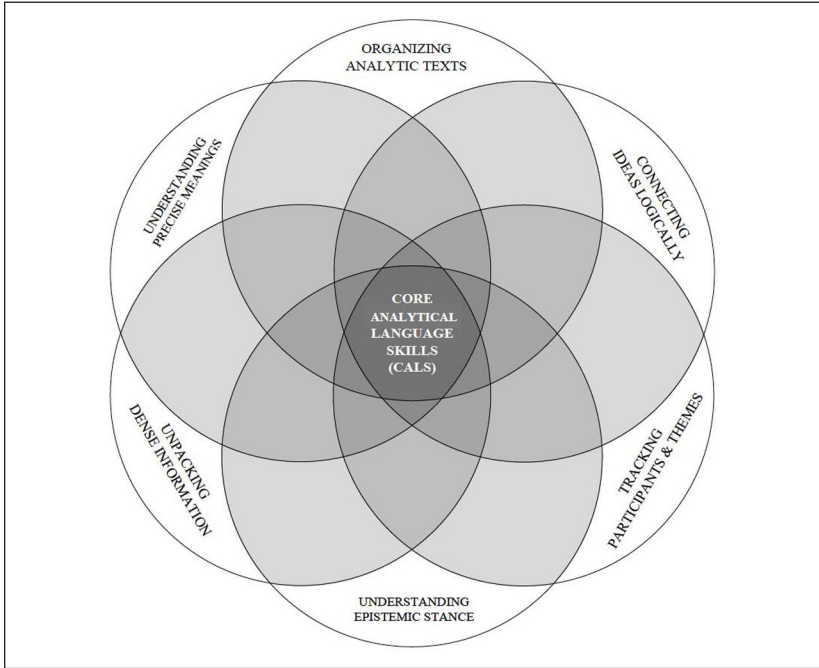
> ANNOTATED SAMPLE TEXT
>
> Scientists have *concluded* that ***evidence*** shows that **[**the Earth's temperatures **]** have increased in recent decades. Moreover, most scientists *concur* that it is EXTREMELY LIKELY that humans are causing most of this problem through **[activities** that increase **[concentrations** of greenhouse gases **]]**.

CALS, linguistic resources identified as challenging beyond academic vocabulary:

- Connecting Ideas: Connectives (boxed)
- Dense information: **Nominalizations** (bolded) & [Complex noun phrases] (brackets)

- Epistemic stance: **WRITER'S VIEWPOINT MARKERS** [uppercase]
- Tracking ideas: <u>Conceptual anaphora</u> (underlined)
- *Understanding precise meanings: Vocabulary about thinking and discourse (italics)*
- Organizing analytical text: Not illustrated here as this would require a longer text

Appendix 2

Definition Task & Persuasive Essay Prompt

Maria and Jim are writing a dictionary for adults.

They would like your help writing some definitions for their dictionary! Can you help them?

Remember that a dictionary is a book that contains words and their meanings.

☐ **Directions:**

- Write what each word means. Remember that your definitions are for a dictionary for adults.

↓ **Now, I want you to complete these items.**

1. bicycle

_____
_____

2. anger

_____
_____
_____

Should we allow iPads in our classrooms?

Some schools allow students to use iPads for learning.

Imagine that your school decided to give iPads to all students, so everyone has the opportunity to use iPads for learning. Most teachers like the iPads because all students can use online dictionaries and search the internet for interesting information. But in the last few weeks some students have used their iPads to post videos with mean comments about other kids online. Now, many parents are worried about this situation. **Because of this problem, your Principal has decided that iPads will no longer be allowed in school!**

Write an article for the school newspaper that argues for or against allowing iPads at your school.
* Make sure to give specific reasons to support your position and to convince the people who read the article to agree with you.
* Explain how the Principal's decision can impact you and others.
* Discuss other things that the school community could do to solve the iPad problem.

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Notes

1. It is important to acknowledge that Student 3 had a Special Education designation, but the other three students did not.
2. Certainly, the first striking difference is in the length of these texts. Length tends to be highly correlated with writing quality and, thus, it constitutes a confounding factor that needs to be controlled in language analysis research. Yet, whereas in research we need to find creative and rigorous ways to remove—or reduce—the impact of text length from our analyses, it is important to highlight that students who produce texts that are consistently shorter than expected at school accumulate less writing practice over time, and thus, would benefit from pedagogical attention. Just as reading experience leads to better reading skills, it is expected that the more students write, the more practice they will get, which in turn should contribute to their writing development. .

References

Adlof, S. M., & Catts, H. W. (2015). Morphosyntax in poor comprehenders. *Reading and Writing*, *28*(7), 1051-1070.

Aguilar, G., Uccelli, P., & Phillips Galloway, E. (2020). Toward biliteracy: Unpacking the contribution of mid-adolescent Spanish and English academic language skills to English reading comprehension. *TESOL Quarterly*, *54*(4), 1010-1036. https://doi.org/10.1002/TESQ.570

Al-Adeimi, S., & O'Connor, C. (2021). Exploring the relationship between dialogic teacher talk and students' persuasive writing. *Learning and Instruction*, *71*, 1-10. https://doi.org/10.1016/j.learninstruc.2020.101388

Alamargot, D., & Fayol, M. (2009). Modelling the development of written composition. In *R. Beard* (Ed.), *The SAGE handbook of writing development* (pp. 23-47). SAGE.

Andreev, L., & Uccelli, P. (2023). The secret life of connectives: Using a new taxonomy to study individual differences in mid-adolescents' use of connectives in writing to persuade. *Reading and Writing*. Advance online publication. https://doi.org/10.1007/s11145-023-10425-3

Bailey, A. L. (2007). *The language demands of school: Putting academic English to the test*. Yale University Press.

Barr, C., Phillips Galloway, E., & Uccelli, P. (2019). Design and validation of a construct to capture the academic language skills that support text understanding. *Language Learning*, *69*(4), 978-1021. https://doi.org/10.1111/lang.12365

Baugh, J. (2018). *Linguistics in pursuit of justice*. Cambridge University Press.

Baytelman, A., Iordanou, K., & Constantinou, C. P. (2022). Prior knowledge, epistemic beliefs and socio-scientific topic context as predictors of the diversity of

arguments on socio-scientific issues. In *K. Korfiatis & M. Grace* (Eds.), *Current research in biology education* (pp. 45-57). Springer.

Beers, S. F., & Nagy, W. E. (2011). Writing development in four genres from grades three to seven: Syntactic complexity and genre differentiation. *Reading and Writing*, *24*(2), 183-202.

Benelli, B., Belacchi, C., Gini, G., & Lucangeli, D. (2006). "To define means to say what you know about things": The development of definitional skills as metalinguistic acquisition. *Journal of Child Language*, *33*, 71-97.

Benson, C. (2013). Towards adopting a multilingual habitus in educational development. In *C. Benson & K. Kosonen* (Eds.), *Language issues in comparative education: Inclusive teaching and learning in non-dominant languages and cultures* (pp. 283-299). Sense Publishers.

Berman, R. A. (2009). Developing linguistic knowledge and language use across adolescence. In *E. Hoff & M. Shatz* (Eds.), *Blackwell handbook of language development* (pp. 347-367). Wiley-Blackwell.

Berman, R. A., & Nir-Sagiv, B. (2007). Comparing narrative and expository text construction across adolescence: A developmental paradox. *Discourse Processes*, *43*, 79-120. https://doi.org/10.1080/01638530709336894

Biber, D., & Conrad, S. (2009). *Register, genre, and style*. Cambridge University Press.

Bourdieu, P. (1991). *Language and symbolic power*. Polity Press.

Brimo, D., Apel, K., & Fountain, T. (2017). Examining the contributions of syntactic awareness and syntactic knowledge to reading comprehension. *Journal of Research in Reading*, *40*(1), 57-74.

Cardoso, B., & Paulet, N. (2023). *Aprender a estudar textos. Laboratório de Educaçao*. https://aprenderaestudartextos.org.br/sobre/

Christie, F., & Derewianka, B. (2008). *School discourse: Learning to write across the years of Schooling*. Continuum.

Crossley, S. A., Weston, J. L., McLain Sullivan, S. T., & McNamara, D. S. (2011). The development of writing proficiency as a function of grade level: A linguistic analysis. *Written Communication*, *28*(3), 282-311. https://doi.org/10.1177/0741088311410188

Crosson, A., Lesaux, N., & Martiniello, M. (2008). Factors that influence comprehension of connectives among language minority children from Spanish-speaking backgrounds. *Applied Psycholinguistics*, *29*, 603-624.

Cummins, J. (1991). Interdependence of first- and second-language proficiency in bilingual children. In *E. Bialystok* (Ed.), *Language processing in bilingual children* (pp. 70-89). Cambridge University Press.

Cummins, J. (2014). Language and identity in multilingual schools: Constructing evidence-based instructional policies. In *D. Little, C. Leung, & P. Van Avermaest* (Eds.), *Managing diversity in education: Language, policies, pedagogies* (pp. 3-26). Multilingual Matters.

Cummins, J. (2016). Reflections on Cummins (1980), "The Cross-lingual dimensions of language proficiency: Implications for bilingual education and the optimal age issue." *TESOL Quarterly*, *50*, 940-944.

Delpit, L., & Dowdy, J. K. (2002). *The skin that we speak: Thoughts on language and culture in the classroom*. The New Press.

Deng, Z., Uccelli, P., & Snow, C. (2022). Diversity of advanced sentence structures (DASS) in writing predicts argumentative writing quality and receptive academic language skills of fifth-to-eighth grade students. *Assessing Writing*, *53*, 100649.

Fang, Z., & Park, J. (2020). Adolescents' use of academic language in informational writing. *Reading and Writing*, *33*, 97-119. https://doi.org/10.1007/s11145-019-09937-8

Fang, Z., & Schleppegrell, M. J. (2008). *Reading in secondary content areas: A language-based pedagogy*. University of Michigan Press.

Farnia, F., & Geva, E. (2013). Growth and predictors of change in English language learners' reading comprehension. *Journal of Research in Reading*, *36*(4), 389-421.

Figueroa, J., Meneses, A., & Chandia, E. (2018). Academic language and the quality of written arguments and explanations of Chilean 8th graders. *Reading and Writing*, *31*, 703-723. https://doi.org/10.1007/s11145-017-9806-5

Geva, E., & Farnia, F. (2012). Developmental changes in the nature of language proficiency and reading fluency paint a more complex view of reading comprehension in ELL and EL1. *Reading and Writing*, *25*, 1819-1845.

Gutiérrez, K. D., & Rogoff, B. (2003). Cultural ways of learning: Individual traits or repertoires of practice. *Educational Researcher*, *32*(5), 19-25. https://doi.org/10.3102/0013189X032005019

Halliday, M. A. K. (2004/2006). *The language of science*. Continuum.

Heath, S. B. (1983). *Ways with words: Language, life, and work in communities and classrooms*. McGraw-Hill.

Heath, S. B (2012). *Words at work and play: Three decades in family and community life*. Cambridge University Press.

Hemphill, L., & Snow, C. (1998). Language and literacy development: Discontinuities and differences. In D. R. Olson & N. Torrance (Eds.), *The handbook of education and human development: New models of learning, teaching and schooling* (pp. 169–196). Blackwell Publishers.

Jo, C. W. (2021a). Short vs. extended adolescent academic writing: A cross-genre analysis of writing skills in written definitions and persuasive essays. *Journal of English for Academic Purposes*, *54*, 101014. https://doi.org/10.1016/j.jeap.2021.101014

Jo, C. W. (2021b). Exploring general versus academic English proficiency as predictors of adolescent EFL essay writing. *Written Communication*, *38*(2), 208-246. https://doi.org/10.1177/0741088320986364

Jones, S. M., LaRusso, M., Kim, J., Kim, H. K., Selman, R., Uccelli, P., Barnes, S., Donovan, S., & Snow, C. E. (2019). Experimental effects of word generation on vocabulary, academic language, perspective taking, and reading comprehension in high-poverty schools. *Journal of Research on Educational Effectiveness*, *12*(3), 448-483. https://doi.org/10.1080/19345747.2019.1615155

Kieffer, M. J. (2014). Morphological awareness and reading difficulties in adolescent Spanish-speaking language minority learners and their classmates. *Journal of Learning Disabilities*, *47*(1), 44-53.

Kieffer, M. J., & Lesaux, N. K. (2008). The role of derivational morphological awareness in the reading comprehension of Spanish-speaking English language learners. *Reading and Writing*, *21*, 783-804.

Kim, Y. S. G., & Schatschneider, C. (2017). Expanding the developmental models of writing: A direct and indirect effects model of developmental writing (DIEW). *Journal of Educational Psychology*, *109*(1), 35-50.

Kyle, K., & Crossley, S. A. (2015). Automatically assessing lexical sophistication: Indices, tools, findings, and application. *TESOL Quarterly*, *49*, 757-786. https://doi.org/10.1002/tesq.194

Larrain, A., Fortes, G., & Rojas, M. T. (2021). Deliberative teaching as an emergent field: The challenge of articulating diverse research agendas to promote educational experiences for citizenship. *Frontiers in Psychology*, *12*, 1-15. https://doi.org/10.3389/fpsyg.2021.660825

Lee, C. D., White, G., & Dong, D. (Eds.). (2021). *Educating for civic reasoning and discourse*. National Academy of Education.

Lipka, O., & Siegel, L. S. (2012). The development of reading comprehension skills in children learning English as a second language. *Reading and Writing*, *25*(8), 1873-1898.

Meneses, A., Uccelli, P., Santelices, M. V., Ruiz, M., Acevedo, D., & Figueroa, J. (2017). Academic language as a predictor of reading comprehension in monolingual Spanish-speaking readers: Evidence from Chilean early adolescents. *Reading Research Quarterly*, *53*(2), 223-247. https://doi.org/10.1002/rrq.192

Meneses, A., Hugo, E., Montenegro, M., Valenzuela, A., & Ruiz, M. (2018). Explicaciones científicas: Propuestas para la enseñanza del lenguaje académico. *Boletín de Lingüística*, 49-50, 134-157.

Moje, E. B., Dillon, D. R., & O'Brien, D. (2000). Reexamining roles of learner, text and context in secondary literacy. *Journal of Educational Research*, *93*(3), 165180. https://doi.org/10.1080/00220670009598705

Moll, L. (2019). Elaborating funds of knowledge: Community-oriented practices in international contexts. *Literacy Research*, *69*, 130-138.

Monte-Sano, C., De La Paz, S., Felton, M., Piantedosi, K. W., Yee, L. S., & Carey, R. L. (2017). Learning to teach disciplinary literacy across diverse eighth-grade history classrooms within a district-university partnership. *Teacher Education Quarterly*, *44*(4), 98-124.

Nagy, W., Berninger, V., Abbott, R., Vaughan, K., & Vermeulen, K. (2003). Relationship of morphology and other language skills to literacy skills in at-risk second-grade readers and at-risk fourth-grade writers. *Journal of Educational Psychology*, *95*(4), 730-742.

Nagy, W., & Townsend, D. (2012). Words as tools: Learning academic vocabulary as language acquisition. *Reading Research Quarterly*, *47*(1), 91-108.

Ninio, A., & Snow, C. E. (1996). *Pragmatic development*. Westview Press.

Nippold, M. A. (2007). *Later language development: School-age children, adolescents, and young adults* (3rd ed.). Pro-Ed.

Nippold, M. A., & Sun, L. (2010). Expository writing in children and adolescents: A classroom assessment tool. *Perspectives on Language Learning and Education*, *17*(3), 100-107.

Nokes, J. D., & De La Paz, S. (2018). Writing and argumentation in history education. In *S. A. Metzger & L. M. Harris* (Eds.), *The Wiley international handbook of history teaching and learning*. Wiley Blackwell.

Oakhill, J. V., Cain, K., & Bryant, P. E. (2003). The dissociation of word reading and text comprehension: Evidence from component skills. *Language and Cognitive Processes*, *18*(4), 443-468.

Ochs, E., & Schieffelin, B. (2017). Language socialization: An historical overview. In *P. Duff & S. May* (Eds.), *Language socialization. Encyclopedia of language and education* (pp. 1-14). Springer. https://doi.org/10.1007/978-3-319-02327-4_1-2

O'Reilly, T., & McNamara, D. S. (2007). The impact of science knowledge, reading skill, and reading strategy knowledge on more traditional "high-stakes" measures of high school students' science achievement. *American Educational Research Journal*, *44*, 161-196.

O'Reilly, T., Wang, Z., & Sabatini, J. (2019). How much knowledge is too little? When a lack of knowledge becomes a barrier to comprehension. *Psychological science*, *30*(9), 1344-1351.

Paris, D. (2021). Culturally sustaining pedagogies and our futures, *The Educational Forum*, *85*(4), 364–376. https://doi.org/10.1080/00131725.2021.1957634

Peng, A., Orosco, M. J., Wang, H., Swanson, H. L., & Reed, D. K. (2021). Cognition and writing development in early adolescent English learners. *Journal of Educational Psychology*. Advance online publication. https://doi.org/10.1037/edu0000695

Phillips Galloway, E., Qin, W., & Uccelli, P. (2019). Academic language proficiency predicts early adolescents' writing quality. In *E. Silliman* (Ed.), *Reading and writing, special volume*.

Phillips Galloway, E., Qin, W., Uccelli, P., & Barr, C. (2020). The role of cross-disciplinary academic language skills in disciplinary, source-based writing: Investigating the role of core academic language skills in science summarization for middle grade writers. *Reading and Writing*, *33*, 13-44. https://doi.org/10.1007/s11145-019-09942-x

Phillips Galloway, E., & Uccelli, P. (2019a). Beyond reading comprehension: Exploring the additional contribution of Core Academic Language Skills to early adolescents' written summaries. *Reading and Writing*, *32*, 729–759. https://doi.org/10.1007/s11145-018-9880-3

Phillips Galloway, E., & Uccelli, P. (2019b). Examining developmental relations between core academic language skills and reading comprehension for emergent bilingual learners and their peers. *Journal of Educational Psychology*, *111*, 15-31. https://doi.org/10.1037/edu0000276

Phillips Galloway, E., Uccelli, P., Aguilar, G., & Barr, C. (2020). Exploring the cross-linguistic contribution of Spanish and English academic language skills to English text comprehension for middle-grade dual language learners. *AERA Open*, *1*, 1-20. https://doi.org/10.1177/2332858419892575

Proctor, C. P., August, D., Carlo, M. S., & Snow, C. (2006). The intriguing role of Spanish language vocabulary knowledge in predicting English reading comprehension. *Journal of Educational Psychology*, *98*(1), 159-169.

Qin, W., & Uccelli, P. (2020). Beyond linguistic complexity: Assessing register flexibility in EFL writing across contexts. *Assessing Writing*, *45*, 100465. https://doi.org/10.1016/j.asw.2020.100465

RAND Reading Study Group. (2002). *Toward an R&D program in reading comprehension*. RAND.

Ravid, D., & Tolchinsky, L. (2002). Developing linguistic literacy: A comprehensive model. *Journal of Child Language*, *29*, 417-447.

Reznitskaya, A., & Wilkinson, I. A. G. (2017). *The most reasonable answer: Helping students build better arguments together*. Harvard Education Press.

Romero, S., Silva-Maceda, G., & Snow, C. E. (2021). Vocabulario académico y habilidades lingüísticas: Predictores de la comprensión lectora de estudiantes de primaria y secundaria en México. *Pensamiento Educativo: Revista de Investigación Educacional Latinoamericana*, *59*(2), 1-16. https://doi.org/10.7764/pel.58.2.2021.4

Sabatini, J., O'Reilly, T., Halderman, L., & Bruce, K. (2014). Broadening the scope of reading comprehension using scenario-based assessments: Preliminary findings and challenges. *International Journal Topics in Cognitive Psychology*, *114*, 693-723. https://doi.org/10.4074/S0003503314004059

Schleppegrell, M. J. (2004). *The language of schooling: A functional linguistics perspective*. Erlbaum.

Shanahan, T. (2016). Relationships between reading and writing development. In *C. A. MacArthur, S. Graham, & J. Fitzgerald* (Eds.), *Handbook of writing research* (pp. 194-207). Guilford Press.

Skerrett, A. (2020). Social and cultural differences in reading development: Instructional approaches, learning gains, and challenges. In *E. B. Moje, P. Afflerbach, P. Enciso, & N. Lesaux*. (Eds.), *Handbook of reading research* (Vol. V, pp. 328-344). Routledge.

Stahl, S. A., & Nagy, W. E. (2006). *Teaching word meanings*. Erlbaum.

Taylor, K., Lawrence, J., Connor, C., & Snow, C. E. (2018). Cognitive and linguistic features of adolescent argumentative writing: Do connectives signal more complex reasoning? *Reading and Writing*, *32*, 983-1007. https://doi.org/10.1007/s11145-018-9898-6

Toulmin, S. E. (2003). *The uses of argument*. Cambridge University Press.

Townsend, D., & Collins, P. (2009). Academic vocabulary and middle school English learners: An intervention study. *Reading & Writing*, *22*, 993-1019. https://doi.org/10.1007/s11145-008-9141

Uccelli, P. (2023). Midadolescents' language learning at school: Toward more just and scientifically rigorous practices in research and education. *Language Learning*. Advance online publication. https://doi.org/10.1111/lang.12558

Uccelli, P., & Aguilar, G. (2018). Spanish and English skills and practices that support bilingual students' literacy achievement: Lessons from innovative assessments and participants' voices. In *D. L. Baker, C. Richards-Tutor, & D. Lee Basaraba* (Eds.), *Second language acquisition: Methods, perspectives and challenges* (pp. 63-94). Nova Science Publishers.

Uccelli, P., & Boix Mansilla, V. (2020/2022). *Pedagogies of voices* [Working paper]. Radcliffe-funded Accelerator Workshop. Harvard University. https://language-forlearning.gse.harvard.edu/publications

Uccelli, P., Deng, Z., Phillips Galloway, E., & Qin, W. (2019). The role of language skills in mid-adolescents' science summaries. *Journal of Literacy Research*, *51*(3), 357-380. https://doi.org/10.1177/1086296X19860206

Uccelli, P., Dobbs, C., & Scott, J. (2013). Mastering academic language: Organization and stance in the persuasive writing of high school students. *Written Communication*, *30*(1), 36-62. https://doi.org/10.1177/0741088312469013

Uccelli, P., Phillips Galloway, E., Barr, C., Meneses, A., & Dobbs, C. (2015). Beyond vocabulary: Core Academic Language Skills (CALS) that support text comprehension. *Reading Research Quarterly*, *50*(3), 337–356. https://doi:10.1002/rrq.104

Uccelli, P., & Phillips Galloway, E. (2017). Academic language across content areas: Lessons from an innovative assessment and from students' reflections about language. *Journal of Adolescent & Adult Literacy*, *60*(4), 395-404. https://doi.org/10.1002/jaal.553

Uccelli, P., Phillips Galloway, E., Aguilar, G., & Allen, M. (2020). Amplifying and affirming students' voices through CALS-informed instruction. *Theory into Practice*, *59*(1), 75-81. https://doi.org/10.1080/00405841.2019.1665413

Uccelli, P., Phillips Galloway, E., & Qin, W. (2020). The language for school literacy: Widening the lens on language and reading relations during adolescence. In *E. B. Moje, P. Afflerbach, P. Enciso, & N. K. Lesaux* (Eds.). *Handbook of reading research* (*Vol. V*, pp. 155-179). Routledge.

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