From Persuade to Persuasion: Comparing Nominalizations Across Subjects in Sixth Grade Persuasive Essays

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From *persuade* to *persuasion*:

Comparing nominalizations across subjects in sixth grade persuasive essays

Qualifying Paper

Submitted by:

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TABLE OF CONTENTS

I.   Introduction

"Education then, beyond all other devices of human origin, is a great equalizer of

conditions of men--the balance wheel of the social machinery."

Horace Mann

In 1848, Horace Mann envisioned education as the catalyst through which the

class divide would be broken; the have-nots would have an opportunity to escape poverty

through education. Over 160 years later, in his 2012 address to the Education Trust

Conference, Arne Duncan echoed this sentiment, also calling education "the great

equalizer" and "the surest path out of poverty." The persistent gaps in achievement

between rich and poor, Black and White, English language learner and native speaker of

English (Aud & Hannes, 2011), however, reveal that the American education system is

far from achieving its goal to provide all children with a high quality education.

Even prior to entering school, children from different socioeconomic backgrounds

differ in their experiences with language. The literacy environments within which they

are socialized help shape their vocabulary production (Hart & Risley, 1995), vocabulary

growth (Rowe, Raudenbush, & Goldin-Meadow, 2012), comprehension and sentence

complexity (Fenson, Dale, Reznick, Thal, Bates, & Pethick, 1994), all of which are

associated with later vocabulary growth (Tabors, Snow, and Dickinson, 2001). While

some children may be exposed to literacy experiences that are aligned with those valued

in school contexts, others may not. Thus, those who come from literacy-rich

environments are automatically 'ahead' of their counterparts who have not been

socialized into similar opportunities of literacy experiences. This may not occur through

explicit means; rather, children "can become the casualties of invisible criteria in school"

(Zwiers, 2014, p.9) when they are expected to participate in discourse contexts with which they have not had experience (Schleppegrell, 2004). As US schools continue to diversify – linguistically, culturally, and economically – not only can we expect continuing challenges, but opportunities to address these challenges.

Literacy skills are the cornerstone of all learning; to succeed in any and all subjects, students need to attain high levels of literacy. An important yet difficult component of literacy is writing, a cognitive, social, and linguistic task requiring a writer to manage several demands at once, with the goal of communicating one's thoughts to a non-present audience (Gee, 2007). Not only is writing difficult to produce, but it is a complex task which is oftentimes difficult to instruct, partly due to the lack of comprehensive research on effective writing instruction and the disconnect between research and practice (Myhill & Fisher, 2010).

Students' success in school is in part dependent upon their success in mastering the genre of academic writing; in particular, middle school students are introduced to a new genre in writing – persuasive essays. Unlike narrative essays, which are more common in the elementary grades, persuasive essays make more cognitive and linguistic demands (Nippold, 2000; Salahu-Din, Persky, & Miller, 2008). This genre is emphasized in the Common Core State Standards across content areas (National Governors Association, 2010) and it requires writers to take a position, devise arguments to which their audience can relate, support these arguments with evidence and reasons, consider counterarguments, and offer rebuttals, all with the goal of presenting the reader with a logical conclusion (Toulmin, 2003; Hillocks, 2002). Though students are expected to master this genre by the end of high school (Hillocks, 2002; National Governors

Association, 2010), in preparation for college entrance exams such as the SAT and the ACT, which often examine students' written skills through persuasive essays (College Board, 2012), many struggle to write proficiently (National Commission on Writing, 2006).

Educators (e.g. Delpit, 1995; Scarcella, 2003; Schleppegrell, 2004) have long called for the explicit teaching of *academic language* – the constellation of linguistic features students are expected to master for academic success (Schleppegrell, 2001). Using the metaphor of a cognitive toolbox, Díaz-Rico and Weed (2002) describe academic language as enabling the thinking skills and offering the language resources functional for producing and comprehending complex concepts. Thus, academic language is very much a dynamic set of tools that helps students get things done; for example, *discipline-specific vocabulary* can help students communicate using precise language, whereas *connectives* help students connect their thoughts in writing (Zwiers, 2014). Knowledge of these tools, however, is not sufficient, as students must learn the skills that enable them to use these tools effectively (Zwiers, 2014). Learning the skills and tools embedded within academic language can help students effectively navigate many expectations of schooling, including learning how to effectively organize ideas into well-structured, well-supported, concisely written, persuasive essays. Research in this area has the potential to illuminate ways in which writing develops by making explicit individual differences in students' mastery of the linguistic features expected in school writing. This paper is motivated by the hypothesis that making language demands of writing explicit to teachers – and therefore teachable to students – might help improve middle school students' written skills.

Academic Language

Though academic language has been defined and explained through many perspectives, for educators "immersed in school language," describing academic language may be an instance of "fish trying to describe water" (Zwiers, 2014, p.25). One of the most noteworthy distinctions between every day, social language and the more academic language encountered in school texts was made by Cummins (1980), who called the first *basic interpersonal communicative skill* (BICS) and the second *cognitive academic language proficiency* (CALP). Cummins argued that students were incorrectly assumed to be academically proficient because of their aptitude in using social, everyday language (BICS). However, these students did not perform well academically because their schools failed to recognize that they were not proficient in the skills required to succeed in school – academic language (CALP). Applied to English language learners (ELLs), Cummins argued that BICS is less complex and less abstract, and therefore develops more quickly and easily than CALP; while English language learners could be expected to develop BICS within 2-3 years of learning English, he observed that it takes approximately 5-7 years for ELLs to develop proficiency in CALP. As noted by Snow and Uccelli (2009), while Cummins' BICS/CALP distinction was crucial in that it highlighted the distinction between colloquial and academic language, Cummins did not actually outline the specific language features associated with academic language. There is no sharp distinction between colloquial and academic language, as they lie along a continuum rather than being discrete, easily distinguishable categories.

Academic language has also been analyzed in the context of Systemic Functional Linguistics (SFL), where it is viewed as a dynamic process that cannot be contained

within a single definition (Halliday, 1994). As such, there are several features associated

with academic language, including *lexical density*, particular kinds of *discourse markers*,

detached stance, particular uses of *modal verbs*, a wide variety of *connectives*, and

nominalizations (Snow & Uccelli, 2009), all of which combine to make academic texts

more concise and precise. Students encounter these various features in their school texts

and are expected to produce them in their writing. This paper will focus on one feature of

written academic language: nominalization.

Nominalization Defined

In this paper, I refer to nominalization as the process of converting verbs and

adjectives into nouns (Martin, 1991). Within the Systemic Functional Linguistics

framework, Halliday (1994) asserts that to nominalize is to make processes, relationships

or qualities into things (nouns). To elaborate, Halliday defines nominalization as a type

of *grammatical metaphor*, by which nouns can refer to 'processes' or 'qualities' (which

are typical functions of verbs and adjectives) rather than to 'entities,' thus taking on a

metaphorical function within a sentence (Halliday, 2004). To illustrate his conception of

nominalization as grammatical metaphor, consider the following example offered by

Halliday: "*He was kind and brave*" is a sentence expressed with the qualities (adjectives)

kind and *brave*, but can be re-expressed using grammatical metaphor with two

nominalizations: "*His kindness and bravery*," which now allows those nominalized

qualities to be elaborated upon (Halliday, 1994).

Nominalizations can occur through transforming verbs (*devote* → *devotion*),

adjectives (*bright* → *brightness*), or (less commonly), nouns (*child* → *childhood*).

Certain verbs and adjectives can be converted into nouns with morphological changes,

whereas others do not require any manipulation. *Derivational nominalization* involves conversion of nouns to verbs through the addition of derivational suffixes (Biber, Johansson, Leech, Conrad, & Finegan, 1999), as in the verb *nominalize*, which can be converted to the noun, *nominalization,* with the addition of the derivational suffix *–tion*. In contrast, *zero-affix nominalization* or non-derivational nominalization, does not involve morphological changes. For example, *debate* can be used as a noun rather than a verb: "*A debate took place*." In this case, the verb did not undergo morphological changes in order to yield its nominal. Thus, nominalization functions as a type of grammatical metaphor in SFL, and enables the conversion of whole clauses into noun phrases that might include nominalizations, with or without morphological changes.

Function

Nominalization is one mechanism involved in the movement along the continuum from colloquial to academic language, as its presence helps construct a more academic genre, especially in writing (Eggins, 2004). Whereas spoken registers[1] frequently feature agents engaged in actions (through the use of verbs), the written academic register employs to a larger degree a transformation of actions into entities by grammatically transforming them into nouns.

Functionally, nominalization plays a central role in academic writing as it allows writers to write in a concise manner. It also contributes to the lexical density of texts (Schleppegrell, 2008), which is a measure expressing the proportion of lexical (meaning-carrying) items (i.e. nouns, verbs, adjectives, and adverbs) in a given text (Ure, 1971;

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[1]A register refers to variation in "what is said, depending on what is being done and on the nature of the activity in which language is being used" (Halliday and Hasan, 1989, p.41). Thus, it refers to the grammatical and lexical features that indicate specific uses of language. Different contexts demand the use of different lexical and grammatical choices; for example, written texts contain different features depending on the purpose of the task (Schleppegrell, 2001).

Halliday, 1985). Academic texts are lexically dense (Schleppegrell, 2001), and nominalization contributes to this complexity because it allows for "the packaging of verbal or clausal meaning in a nominal element" (Schleppegrell, 2008, p. 552). Thus, entire prepositions can be compressed into single noun phrases (e.g. "*Samuel Morse invented Morse code*" becomes "*His invention*"), enabling writers to pack more information into fewer words. In this way, a process that may potentially require several clauses to be explained is captured by a single word or short phrase that can be subsequently linked to a predicate, facilitating the explicit expression of relations among events (e.g. "*Samuel Morse's invention enabled people to receive and instantly transmit information across wide distances.*")

Academic vocabulary is rife with nominalized words, as "words which originated as nominalizations have become standard items of the academic vocabulary, without which academic writers would be unable to say the kinds of things they like to say" (Chafe & Danielewicz, 1987, p.17). For example, words such as "categorization" or "development" have condensed a process that could be described by a full sentence through nominalization, thereby making it easier to refer to these concepts as technical terms without relying on explaining what had developed or what has been categorized (Chafe & Danielewicz, 1987).

In longer texts, nominalization also contributes to text cohesion, in that it allows the condensing of issues that have been developed in a series of clauses into a clausal element, which can then "participate in a chain of reasoning to be developed by the writer" (Schleppegrell, 2008, p. 552). That is, it allows issues to be 'named' such that they can be taken up and elaborated upon (Schleppegrell, 2008). Additionally,

nominalizations contribute to depersonalization of texts (Halliday & Martin, 1993), a feature that is especially prevalent in academic writing where the author usually takes on an impersonal stance.

According to Halliday (1994), nominalizations are especially prevalent in scientific texts. This feature of academic language affords scientists the ability to create technical taxonomies "to distill the results of scientific inquiry into a set of nominalized terms" (Schleppegrell, 2004, p.73). Halliday and Martin (1993) show that scientific information packaging has changed over time, becoming more nominalized. For example, scientific experiments used to be reported using active verbs (e.g. "*I looked through the telescope and saw…*"), whereas today, scientists are more likely to say, "*Observation of the stars indicates that…*" Nominalization contributes to this shift, which further underscores the tendency for academic, and especially scientific, writing to be expressed concisely.

The important functions of nominalization have led to its extensive study, especially in the field of theoretical linguistics. A number of studies have also empirically analyzed the theoretical assertion that nominalizations are a prominent feature of academic texts in general, and scientific texts in particular (Halliday, 1994), by comparing their prevalence in various genres and disciplines.

II.   Empirical Findings

Frequency

In their comparison of nominalizations across genres, Chafe and Danielewicz (1987) found that nominalizations occur much more frequently in academic texts, where they found 92 occurrences per 1,000 words in academic papers, compared to 56 per 1,000

words in lectures, 55 per 1,000 words in letters, and only 27 per 1,000 words in conversations. This further supports the notion that nominalization is one language resource that can be drawn upon to construct more academic discourse. Corpus studies by Biber and colleagues (e.g. Biber, Conrad, & Reppen, 1998) also empirically analyzed nominalizations in existing texts by performing in-depth analyses of non-academic written texts (e.g. mystery novels), academic texts in disciplines such as politics, and several types of oral language such as phone conversations and speeches. They found that nominalizations appeared much more frequently in academic writing, and in a follow-up study (Biber et al., 1999) also found that nominalizations were over 10 times more common in academic prose than conversation. In their 1999 study, Biber and colleagues found that nominalization occurs most frequently through the addition of the suffixes –*tion* and –*ity*, and concluded that non-academic texts rely on verbs and adjectives to describe people's behavior, while academic texts "treat actions and processes as abstract objects separated from human participants," (p. 61) and thereby rely more heavily on nominalizations as a resource.

Biber and colleagues continued to examine nominalization in scientific writing, with a recent study tracing the prevalence of nominalization in writing across time (Biber & Gray, 2013). The authors analyzed 1,417 texts from the 18th, 19th, and 20th centuries, most of which were written academic prose, as well as newspapers, fictional, and dramatic texts. Within academic prose, they analyzed three sub-categories: technical science research writing, technical non-science research writing, and popular science writing. They used computer programs to measure nominal style, which included counting nominalizations, nouns, nouns with noun sequences, and relative clauses. This

study concluded that nominalizations have indeed increased in use over the three centuries analyzed, but the increase was limited to informational written registers (newspapers and all sub-categories of academic prose). Additionally, they found a decrease in verbs and clauses in academic research articles, and predominantly in science research articles. Biber and Gray (2013) conclude that the "combination of a highly specialized audience and a highly informational purpose dealing with technical information is related to the decrease in the use of verbs and clauses" (p. 25). This is related to the notion that writing in these registers is trending toward nominal, not only through nominalization but also through complex and elaborate nominal groups.

Banks (2008) also analyzed the development of scientific writing by examining linguistic features such as passive verbs, first person pronouns, and nominalizations. Though his sample sizes were small, Banks concluded that the frequency of nominalizations has increased over time, in both the physical sciences as well as the biological sciences. The findings from these studies are related to Halliday and Martin's (1993) assertion that information packing in science has changed over time, and nominalizations are therefore expected to be more prevalent in today's scientific works.

Nominalization in Students' Writing

While considerable research examines the prevalence of nominalization in existing text, very few empirical studies show the written development of nominalization use amongst novice writers, across grades, or in different content areas. In writing, nominalization is viewed as a relatively difficult feature of academic language to achieve. For example, in their study on young adolescents' writing, Nippold and Sun (2008) found that morphologically derived nominals were more difficult for 10 and 13 year-old

students than derived adjectives. Nagy and Townsend (2012) hypothesize that the difficulty in producing nominalizations manifests itself in the observation that students do not tend to nominalize until they develop sufficient proficiency in writing. Halliday (1994) also suggested that children do not begin to utilize nominalizations in their writing until the ages of nine or ten. Derewianka (1995) reached a similar conclusion in a study examining the prevalence of nominalizations in writing through a longitudinal case study tracing her own child's linguistic development through adolescence, with a focus on grammatical metaphor (the term related to nominalization in Systemic Functional Linguistics). Derewianka's methodology and her focus on a young child represents a unique approach among the studies reviewed, and highlights the process involved in learning to use nominalizations effectively, including the invention of nominalizations (e.g. "an *increasment* of friction" or "the computer shuts itself down after a period of *stopness*") (p. 118).

Operating under the notion that nominalization can promote the impersonal tone prevalent in academic texts, Baratta (2010) examined six undergraduate humanities students' use of nominalization over time and hypothesized that they would use nominalizations more frequently in their writing as they progressed through their academic work. All students were enrolled in the University of Manchester's School of Education. Contrary to his hypothesis, he found that these college students' nominalizations did not increase over time, and concluded that these students were adapting to their program's expectation that students should write in a personal tone. As nominalizations help create abstract and impersonal writing, this finding was therefore not unexpected. The finding also highlights that there may be differences in the frequency

of nominalizations across content areas or disciplines within the academic domain. Swales (1998) asserts that, unlike writing in the natural sciences, writing in disciplines such as the social sciences feature the first person more frequently, thereby creating an authorial voice and thus relying less on nominalization. Thus, Baratta's (2010) study lends support to the notion that because the goals of writing differ by discipline, the grammatical resources writers use will therefore also differ.

In a small study of graduate students, Charles (2003) examined nominalizations across content areas by analyzing the use and frequency of nominalization in politics and materials science (a facet of natural science). She analyzed two Oxford students' MPhil theses in politics and eight doctoral theses in materials science and found that essays in politics used more nominalizations than did materials science essays. Her finding adds complexity to the discipline-specific requirements that lead to the over- or under-utilization of nominalization in writing. Though this study is small, it makes clear that texts about the natural sciences are not the only texts that require a high degree of nominalization. In this case, nominalizations were more prevalent in the social sciences (political essays) due to the purpose of those texts: the predominance of persuasive argumentation in an academic document focused on politics led these students to use nominalization as a way of expressing stance. Collectively, these studies suggest that within academic writing, the frequency of nominalization varies by genre (Chafe & Danielewicz, 1987; Biber, Conrad, & Reppen, 1998; Biber et al., 1999, Biber & Gray, 2013) and discipline (Swales, 1998; Banks, 2008; Charles, 2003), at least among skilled writers.

Nominalizations in (and out of) Context

Nominalization, along with other academic language features such as the use of passive voice in writing, has been criticized. While it is recognized as a ubiquitous feature of academic language and is considered a "grammatical resource" which allows writers to re-present information as given (Schleppegrell, 2001, p. 443) and in a concise manner, its use has also been shown to create ambiguity and hinder accessibility. Nominalizations have been identified as ''prestigious, technical and formal, rather than coming from a more everyday realm" (Ravelli, 1996, p. 380 cited in Schleppegrell, 2001) as well as "a mark of high-level, formal prose" (Berman, 2007, p. 353). While students may wish to aspire to this level of specialty and high-level prose, others argue that writing should be accessible to everyone (MacDonald, 1980) and nominalization should therefore be limited as its overuse can reduce accessibility.

Critical discourse analysts (e.g. Fowler, Hodge, Kress, & Trew, 1979; Fowler, 1991) have also argued that nominalization is a transformation (i.e. transforms verbs to nouns) "which reduces its whole clause to its nucleus, the verb, and turns that into a noun" (Fowler et al., 1979, p.39), thereby causing "syntactic reduction" (p.41). This transformative reduction, in their view, can create ambiguity by deleting the agent. In his study of racism in the British press, van Dijk (1991) describes how nominalization contributed to obscuring the police as active agents in several events dealing with black minorities. Headlines that do not include active verbs, he argues, "are often used to conceal responsible agency" (p.63). Thus, "Death Raid" does not identify the police as the ones who carried out the raid.

Functional linguists have also pointed at the misuse of nominalization. Schleppegrell (1997) argues that when environmental problems are referred to as "extinction of species" or "destruction of the rainforest," in science texts, agents (in this case, humans) are obscured through nominalization (p.52). In her examination of middle school environmental education texts, she finds that sentences with nominalizations can suppress the agency, and thus responsibility, of humans. Thus, texts such as these may undermine their own learning goals because agents should be clearly identified if students are expected to learn about and reflect upon implementing solutions to environmental problems (Schleppegrell, 1997). Agent deletion in nominalization can also create a greater cognitive demand on reading comprehension (Fang, Schleppegrell & Cox, 2006), as the creation of nominal elements may require students to make inferences about the agent and comprehension may be disrupted when such inferences are not made. For example, "*The invention of Morse code*" requires an inference that someone invented Morse code, and for students who do not make this inference, nominalization can be disruptive to comprehension if there are later references to "*the inventor,*" for example, or "*his contribution.*"

Halliday and Martin (1993) also highlight that nominalizations do not belong in all texts; whereas their inclusion in scientific texts offers the aforementioned affordances of information packing and conciseness, when they appear in "bureaucratic discourse" they can "create distance between writer and reader, to depersonalize the discourse and give it a spurious air of being rational and objective" (Halliday & Martin, 1993, p.84). This reinforces the findings about the variability in the prevalence of nominalization in different social contexts.

Though the use of nominalization can allow writers to express themselves concisely, it can also contribute to obscuring agency by dissociating agents from their actions, and can sometimes lead to ambiguous statements that are impersonal and therefore lack a connection with the audience. However, the prevalence and utility of nominalizations in academic texts raises the question of how young writers utilize nominalizations in their own writing. This study is motivated by the assumption that mastering the use of nominalizations will not only help writers generate precise and skilled written communication, but will also serve as a route to understanding them when they are encountered in scientific (and other academic) texts. Ideally, instruction that expands students' language resources and makes them aware of the array of linguistic choices at their disposal in constructing their own meanings would promote students' reflective use of nominalizations. The goal is to explicitly make students aware of how to utilize the conciseness, depersonalization, and text structuring options afforded by nominalizations for the purpose of academic writing, while avoiding the pitfalls resulting from inappropriately utilizing this grammatical resource.

Research Gaps

As stated above, nominalizations have been examined in a wide variety of studies, including those focused on their frequency within different genres (Chafe & Danielewicz, 1987; Biber et al., 1999; Biber, Conrad, & Reppen, 1998), the writings of different disciplines (Charles, 2003; Baratta, 2010; Derewianka, 1995; Nippold & Sun, 2008), and the change in their occurrences over time (Biber & Gray, 2013). The current body of research on nominalization also offers insight into possible differences between native and non-native speakers of English in the comprehension of nominalized texts

(Spyridakis and Isakson, 1998) and the types of nominalizations utilized (Terblanche, 2009). While considerable research has focused on nominalization, especially as it appears in written texts, there are some areas virtually untapped by research.

Overwhelmingly, nominalization research concentrates on the use of nominalization among skilled writers (adults), and therefore does not address the emergence and development of nominalization among novice writers, and specifically adolescents and pre-adolescents. Our current understanding of the development and prevalence of this linguistic feature can be supplemented by more research examining novice writers' use of nominalizations. Given the differences in the frequency of nominalizations per discipline documented for expert writers and the higher frequency of nominalizations in science (e.g. Biber & Gray, 2013) , it is plausible that the writing of novice academic language learners might vary in the frequency or type of nominalizations by school content area. Thus, it would be noteworthy to investigate whether novice writers do in fact nominalize more frequently in their science persuasive essays than in persuasive essays in other contents.

Additionally, because the current body of research mainly examines skilled writers' nominalization, the degree of accuracy in the use of nominalizations has not been explored. Investigating the semantic and syntactic accuracy in the use of nominalizations, however, emerges as an important aspect in novice writers. Finally, even though the studies reviewed do not make a distinction between the categories of nominalizations mentioned at the beginning of this paper (derivational versus zero-affix nominalizations), investigating if the frequency and accuracy of use vary by nominalization category seems also worth exploring in this emerging line of research. To address this research gap, the

present study seeks to contribute to the understanding of how (or whether) young writers utilize nominalization in their writing by examining sixth graders' persuasive essays and their use of this important grammatical resource at an early stage of their academic writing development.

III.   Present Study

Research Context

All essays analyzed in this study were gathered as part of a large intervention study involving urban middle schools in the Northeastern United States. Schools in the intervention implemented the Word Generation Program, a supplementary, cross-disciplinary curriculum developed by the Strategic Education Research Partnership that aims to improve students' academic language and argumentation skills (Snow, Lawrence, & White, 2009). The program consists of a 5-day unit with lesson sequences that introduce adolescents to social or civic dilemmas through short activities, along with six academic words integrated into these activities[2]. Students developed positions on the topic, identified reasons and evidence for their positions, and engaged in debates about the particular issue. At the end of a week of daily lessons focused on the same controversial topic, students were asked to produce a persuasive essay in response to a prompt that asked them to take a stance on the issue (Snow et al., 2009).

Research Questions

The study is guided by the following questions: *Does 6th grade students' use of nominalizations in Science and Social Studies persuasive essays vary by content area?*

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[2] In this study, I refer to these target words as Focus Words, and in some instances, these focus words were already in nominalized form. Students also encountered nominalizations in their worksheets (e.g. as part of the instructions). Thus, I call all encountered nominalizations Nominalized Curricular Words (which include Nominalized Focus Words), and I distinguish them from students' spontaneous nominalizations.

- What is the frequency and diversity of nominalizations used in students' persuasive essays?

- What is the distribution of nominalizations by source (spontaneous vs. curricular words) and category (derivational vs. zero-affix) in Science and Social Studies persuasive essays?

- How accurate (syntactically and semantically) is the use of nominalizations in Science and Social Studies essays?

Thus, this study examines the use of nominalizations among sixth grade students by examining persuasive essays they wrote on Science and Social Studies themes. The study examines the frequency, source, category, and accuracy of nominalizations.

To guide the present analysis, nominalizations are defined as the process of converting verbs and adjectives into nouns (Martin, 1991). Nominalizations derived from verbs and adjectives feature more prominently in scientific texts than those derived from nouns; thus, previous corpus studies have not included noun-derived nominal forms (e.g., *oligarchy* from oligarch) in their analyses (Biber et al. 1999; Biber, Conrad, & Reppen, 1998). Given that this study examines nominalizations produced by less skilled writers, and considers both Science and Social Studies essays, all types of nominalizations will be examined. This also includes zero-affix nominalizations, which have not been included by Biber and colleagues in previous studies. It is hypothesized that students will produce more nominalizations in Science and more derivational than zero-affix nominalizations across both content areas, as zero-affix nominalizations may be viewed as an indicator of whether students understand the function of nominalization, whereas derivational nominalizations may not always indicate that students are, in fact, nominalizing.

Furthermore, an important note related to the presence of nominalizations is the question of whether derivationally related verbs or nouns are more common. Some nominalizations may be learned (and therefore used) as nouns; for example, '*conversation*' might be learned as a noun, and students who use this word are therefore not necessarily using a nominalized form of the verb '*converse*;' rather, they are using the only form known to them, as they may not have prior knowledge of the verb form. However, it is difficult to ascertain which verb forms are more or less common, as well as which forms were taught to students; thus, this study will not distinguish between seemingly more common verb forms which have been nominalized (e.g. *invent*) and those which may be less common (e.g. *converse*).

IV.   Method

Sample

The sample is comprised of 48 Science and 48 Social Studies essays selected from among those written by 96 sixth-grade students attending urban middle schools in the Northeastern part of the United States. All essays were collected as part of the aforementioned Word Generation Program. The essay topics in Science and Social Studies are presented in Tables 1 and 2.

Only one essay per student was selected, and in cases where students had written more than one essay, the essay with the largest number of clauses was chosen. The original sample consisted of 104 essays; however, upon further examination, eight essays were ultimately excluded from the sample. Three Science essays were excluded because the topics were summaries of an experiment rather than a persuasive essay. Additionally, after calculating the frequency of nominalizations, one Social Studies essay and four

additional Science essays were excluded as outliers because they contained more than ten nominalizations[3].

Essay topics

In addition to being introduced to a discussable topic, students were explicitly taught six vocabulary words related to the unit. However, the extent to which students were explicitly instructed to include these Focus Words in their essays is unclear. Whereas some teachers may have emphasized that students include all Focus Words, others may have simply encouraged their incorporation. If all students incorporated all focus words into their essays, every Science essay in this sample would contain at least one nominalized word (Table 1), and all Social Studies essays from units 1 and 3 would contain four and six nominalizations respectively (Table 2).

Additionally, students encountered Nominalized Curricular Words, which appeared in the instructions or prompts on students' essay sheets but were not explicitly taught as Focus Words in the curriculum. For example, students were prompted to "make a recommendation" in some units; words such as these were coded as "Curricular Words" in order to differentiate them from students' spontaneous nominalizations or their nominalized focus words. There were a total of four Science essays and four Social Studies essay topics in this sample. Tables 1 and 2 show the various essay topics as well

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[3] These essays accounted for 17% of the total nominalizations in Social Studies and 30% of nominalizations in the Science essays. Including these essays would have inflated results so they were excluded from the overall sample. These essays often included nominalizations that were repeated various times by the student. For example, the excluded Social Studies essay contained five nominalizations that were repeated to produce a total of 13 nominalizations. Similarly, one of the excluded Science essays contained a total of 11 nominalizations, though there were only six different nominalizations.

as the number of essays analyzed from each unit, and the corresponding nominalized

focus and curricular words.

Table 1

Essay Topics, Number of Essays, Nominalized Focus Words, and Nominalized Curricular Words per Science Unit

Unit #	Science Essay Topics	# of essays	Nominalized Focus Words	Nominalized Curricular Words
1	What would you say to a congressman about what is involved in identifying a mystery powder?	8	Inference, contrast	Recommendation, observation, difference
2	A new company wants to build a dam on a nearby river. Please advise the mayor based on what you know about models[4].	17	Relationship	--
3	A company is building a skateboard park in your neighborhood. Should they worry about building ramps that are very steep?	15	Claim, evidence	Recommendation, suggestion, neighborhood
4	Make a recommendation about how Vocabulandia should select athletes based on what you know about fair tests.	8	Process	Recommendation

As shown in Table 1, the majority of essays were obtained from Units 2 and 3.

Additionally, all units contained at least one focus word that was already in nominalized

form (e.g. *inference*). Other focus words were taught as nouns (*claim, process*), but could

have been used as either nouns or verbs and were therefore coded as nominalizations only

if they were used as nouns. Similarly, *contrast* was taught as a verb, but was given credit

as a nominalization if it was used as a noun. Units 1, 3, and 4 all contained nominalized

curricular words in addition to the focus words.

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[4] In this paper, the word *model* was excluded as a zero-affix nominalization, as it was clear that it was taught as a nominal. Most students produced this word frequently in Unit 2, where it was a Focus Word, and in Unit 3, where it was a Curricular Word. However, in all instances, the word was used as a noun and not as a verb. Thus, students were clearly not *nominalizing* and merely using a *nominal.* See Discussion & Limitations for further details.

Table 2

Essay Topics, Number of Essays, Nominalized Focus Words, and Nominalized
Curricular Words per Social Studies Unit

Unit #	Social Studies Essay Topics	# of essays	Nominalized Focus Words	Nominalized Curricular Words
1	Order or oppression: What do you think is likely to happen in Egypt in the years just ahead? Will Egypt after Mubarak become a more orderly society or a more oppressive one?	18	Order, value, proposal, stability	Argument, oppression, claim, quotation, information, evidence
2	The Space Program: Great achievement or a waste of our surplus wealth?	9	--	Achievement, argument, claim, debate, quotation, waste
3	The city-states of ancient Greece: Would you rather live in Athens or Sparta?	16	Democracy, oligarchy, competition, allegiance, individualism, conformity	Argument, debate, claim, quotation
4	When does it make sense to live next to a volcano?	5	--	Civilizations, argument, claim, location

The majority of essays in the Social Studies sample came from units 1 and 3; in the latter, all six focus words were in nominalized form. Units 1, 3, and 4 contained derivational (e.g. *competition, conformity, proposal*) and zero-affix nominalizations (*value, order*) (Table 2). Both zero-affix nominalizations in Unit 1, *order* and *value*, were taught as nouns. All units also contained a number of nominalized curricular words that appeared in statements such as, "Make a claim."

Coding and Data Analysis

All essays were first transcribed into digital files using the Codes for Human Analysis of Transcripts (CHAT) conventions required by the Computerized Language Analysis (CLAN) program (MacWhinney, 2000). Essays were coded using a scheme developed by the author that captures the following: (i) source, (ii) category, (iii)

semantic and syntactic accuracy of nominalized words. The coding scheme is explained below and can also be found with corresponding examples in Appendices A and B.

(i)   *Source:* Three potential sources of nominalizations were coded:

- *Focus Words* are words which were explicitly taught and which students were strongly encouraged to include in their essays. For example, *inference* and *contrast* appeared in nominalized form as Science focus words (Table 1), whereas *competition* and *conformity* were nominalized focus words in Social Studies (Table 2).

- *Curricular Words* are nominalized words used in the curriculum implemented in the classrooms studied (e.g., *recommendation* and *argument*) which were not explicitly taught but were part of the prompt or the essay instructions (Tables 1 and 2).

- *Spontaneous Words* did not appear in either the list of focus words, or on students' worksheets; thus they are intended to capture students' prior learning[5].

(ii)   *Category:* Two categories of nominalizations were analyzed – derivational nominalizations, and zero-affix nominalizations. In derivational nominalizations, conversion from verb to noun occurs through the addition of derivational suffixes (e.g. *nominalize* → *nominalization*). Verbs used as nouns without undergoing morphological changes (e.g. *debate*) were coded as zero-affix nominalizations.

(iii)   *Accuracy:* Nominalizations were also coded along four levels of semantic and syntactic accuracy:

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[5] Due to uncertainty in fidelity of implementation, the coding did not assume that all students encountered all units in the Word Generation Program, or that they encountered them in the same order given. Thus, it is possible that nominalizations coded as spontaneous may have been encountered as Focus or Curricular Words in other units.

- Nominalizations were coded as *semantically and syntactically accurate* if they did not contain any unconventional uses either in syntax or meaning, thus demonstrating that the student had sufficient knowledge of the word meaning and how to use it in a sentence.

- Nominalizations were coded as *semantically and syntactically inaccurate* when they demonstrated that the student neither knew the meaning of the word nor used it in a syntactically conventional manner within the sentence.

- *Syntactically inaccurate* nominalizations were instances in which it was clear that the student knew the meaning of the word, but there were syntactic errors in the way it in was incorporated into the sentence.

- *Semantically inaccurate* nominalizations were used in a syntactically conventional manner; however, the meaning of the word was incongruent with the rest of the meaning in the sentence and therefore demonstrated the student's lack of knowledge of the word meaning.

In addition to coding the aforementioned characteristics of each nominalization produced by students, the *frequency* and *diversity* of the nominalizations were examined by separately calculating the total number of nominalizations produced (tokens), and the different nominalizations used (types)[6]. A type-token ratio (Retherford, 2000) was then calculated for all nominalizations in each content area. This ratio examines the diversity of nominalizations by examining the relationship between the total number of nominalizations in an essay and the total number of different nominalizations produced. A lower type-token ratio indicates that the nominalizations were not as diversified (i.e.

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[6] To illustrate, an essay containing the nominalizations *oligarchy*, *democracy*, and *competition* has three tokens and three types. However, an essay containing the nominalizations *oligarchy, democracy,* and a repetition of *democracy*, has three tokens but only two types.

students repeated the same nominalizations) whereas a higher type-token ratio indicates that students diversified the nominalizations they produced.

V.   Results

Frequency

Approximately one-fifth (18.75%) of all essays analyzed (18 out of 96) did not contain any nominalizations. Seven of those essays containing no nominalizations were Science essays, while the remaining 11 were Social Studies essays. Thus, 22.92% of Social Studies essays analyzed (11 out of 48) and 14.58% of Science essays (7 out of 48) did not contain nominalizations.

Students produced more total nominalizations in Science essays. There were 166 total nominalizations in Science (tokens), compared to 87 in Social Studies essays. Similarly, there were 112 different nominalizations in Science (types) and 82 in Social Studies essays. The total nominalizations per Science essay ranged from 0-10 while total nominalizations per Social Studies essay ranged from 0-9. Further descriptive statistics are shown in Table 3.

Table 3
Descriptive Statistics by Content Area

	Science	Social Studies
Total Nominalizations (tokens)		
Observations	166	87
Mean	3.46	1.81
SD	2.96	1.79
Min	0	0
Max	10	9
Different Nominalizations (types)		
Observations	112	82
Mean	2.33	1.71
SD	1.60	1.66
Min	0	0
Max	6	8

While students produced more nominalizations in Science, the type/token ratio in Science ($TTR_S = .67$) was lower than Social Studies ($TTR_{SS} = .94$), thereby indicating that more students repeated their nominalized words in Science, whereas nearly all nominalizations produced by students in Social Studies were unique nominalized forms.

To test the mean differences between the samples, two t-tests of unequal variances were conducted: the first tested whether the means of total nominalizations per essay (tokens) differed in science vs. social studies ($\bar{x}_{S\_total} = 3.46$; $\bar{x}_{SS\_total} = 1.81$), and the second tested whether the means of the different nominalizations produced (types) were statistically significantly different ($\bar{x}_{S\_diff} = 2.33$; $\bar{x}_{SS\_diff} = 1.71$). Results revealed that a significantly higher number of nominalization tokens were produced in Science than in Social Studies essays ($t_{obs} = 3.29, df = 78.72, p < .001$). However, the diversity of nominalization types was not found to be significantly larger in Science than in Social Studies essays ($t_{obs} = 1.87, df = 95.87, p = .06$), though the difference was approaching statistical significance.

Thus, when comparing nominalized tokens, there was a statistically significant difference, with Science essays displaying a higher frequency than Social Studies essays. In other words, there were more instances of nominalizations in Science than in Social Studies essays, but there was no difference in the diversity of nominalizations between both content areas. In addition, Science essays more often included more than one instance of the same nominalization type while in Social Studies, almost each use was unique.

Accuracy

The vast majority of nominalizations were both semantically and syntactically accurate (84.34% in Science and 90.8% in Social Studies) (Figure 1).
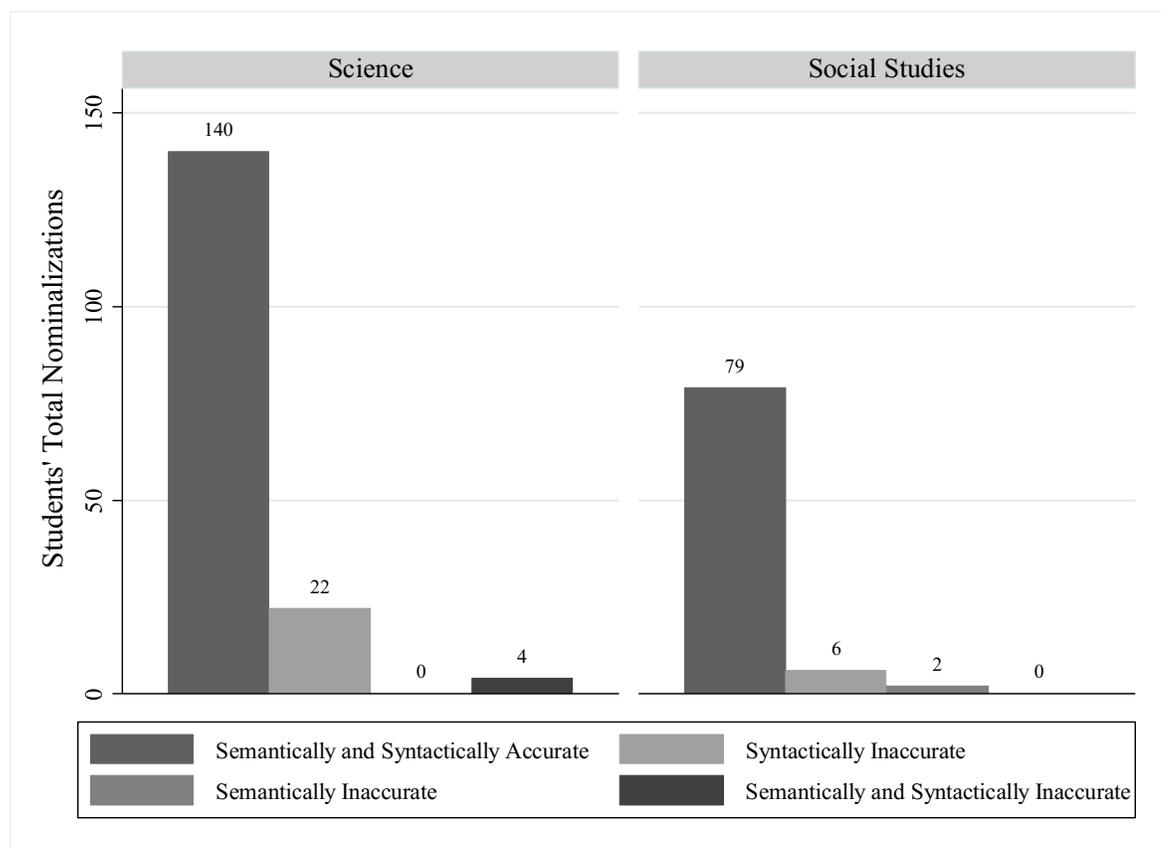

Figure 1. Distribution of total nominalizations by accuracy in Science and Social Studies essays.

As shown in Figure 1, Science essays contained four nominalized words that were both semantically and syntactically inaccurate[7], whereas Social Studies essays did not contain any such occurrences. Similarly, students did not produce semantically inaccurate nominalizations in Science essays, and only produced two in Social Studies. In both sets

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[7] Though in two essays, nominalized focus words were coded as Semantically and Syntactically Inaccurate if the student listed them in the essay without situating them within a sentence.

of essays, the most common inaccuracy was syntactic, though the proportion was higher in Science essays (13.25%) than in Social Studies essays (6.9%).

Source

In Science, students produced a similar number of spontaneous and focus word nominalizations, followed by nominalized curricular words. This is different in Social Studies, where the majority of nominalizations produced were spontaneous, followed by curricular word and focus word nominalizations (Figure 2).
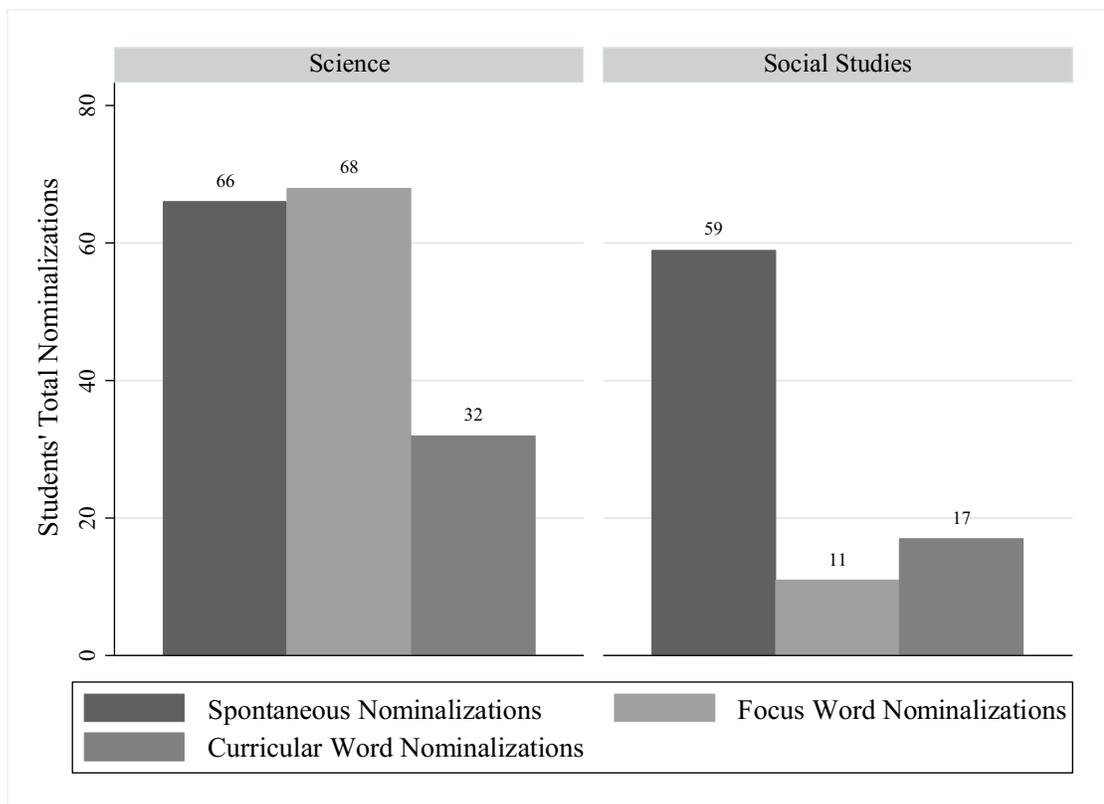

Figure 2. Distribution of total nominalizations by source (spontaneous, focus word, and curricular word nominalizations).

However, when both categories of curricular words were combined and compared to spontaneous nominalizations (Figure 3), it was clear that students produced more curricular word nominalizations in Science (60.24%), and more spontaneous nominalizations in Social Studies (67.82%).

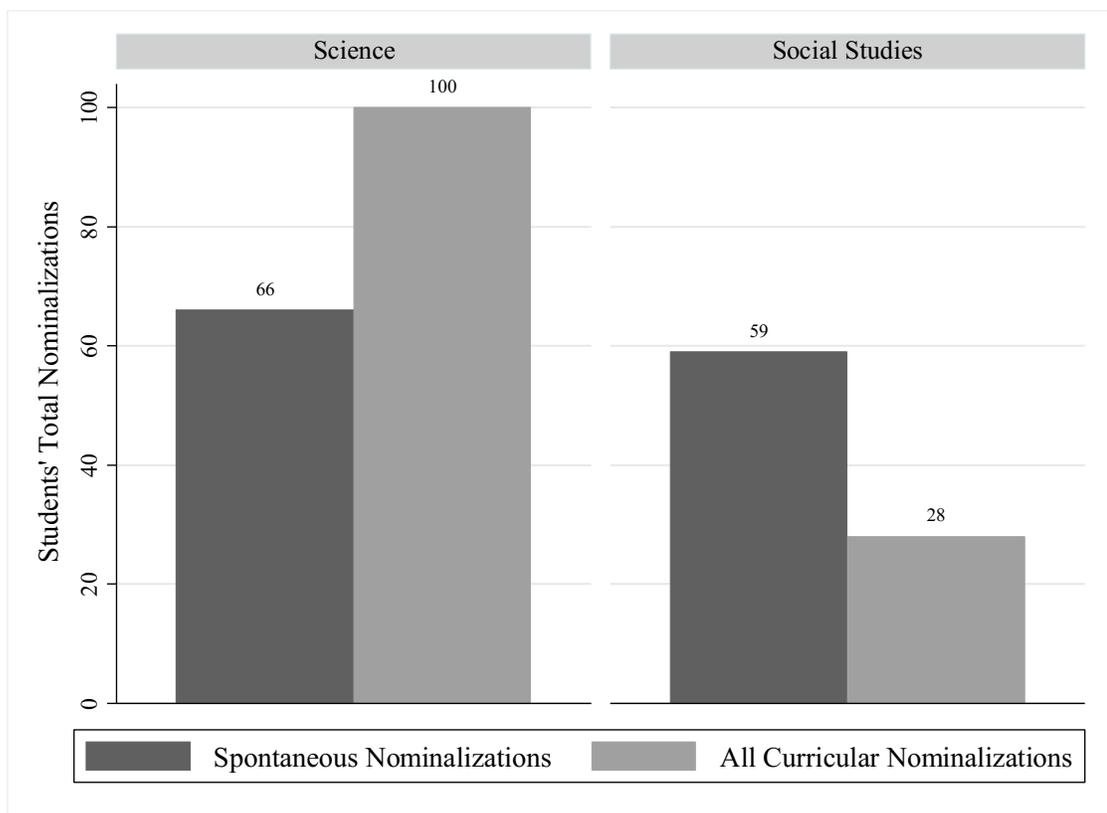*Figure 3:* Distribution of total nominalizations by source: spontaneous and all curricular word nominalizations (focus words combined with curricular words).

Category

Students in both Science and Social Studies essays produced more derivational than zero-affix nominalizations (Figure 4); 68.67% of nominalizations in Science essays and 67.82% of nominalizations in Social Studies essays were derivational nominalizations.
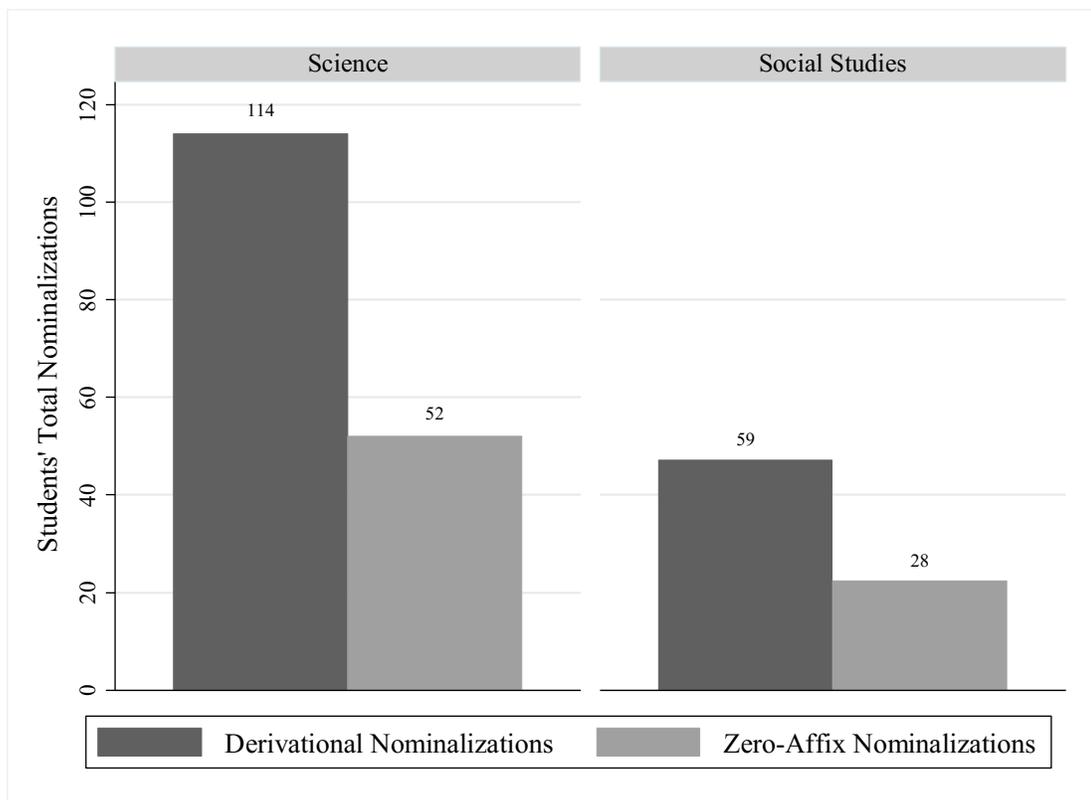
Figure 4. Distribution of total nominalizations by category (derivational vs. zero-affix nominalizations).

Given vs. Produced

The scatterplot in Figure 5 displays the number of different nominalizations students produced (types) as a function of the number of nominalized curricular words available to them. In addition, in order to visually display how prevalent were these associations by content area, the size of each marker (hollow circles in Science and filled circles in Social Studies) indicates the relative number of students at that point. For instance, the graph shows that given one curricular nominalization in Science essays, more students produced one nominalization and fewer students produced three different nominalizations.
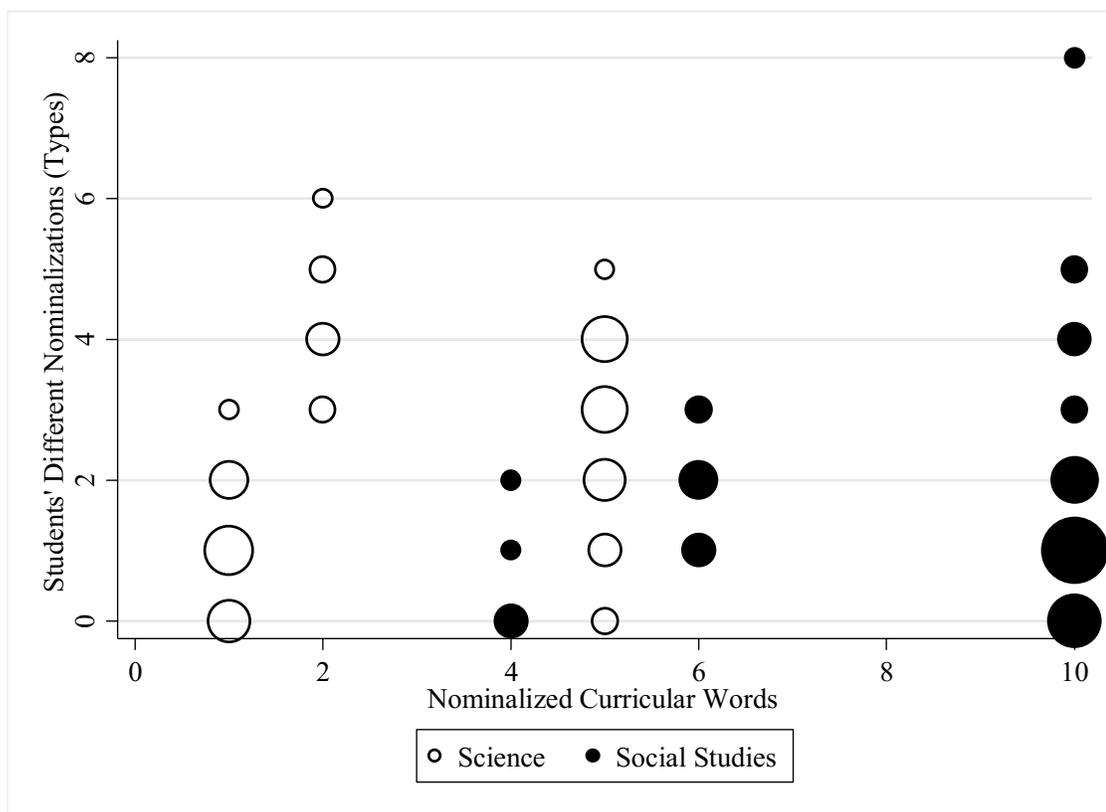
Figure 5. Scatterplot of students' different nominalizations produced by the combined nominalized curricular words available to a given student in Science and Social Studies.

Figure 5 shows that although students were given 4, 6, or 10 curricular word nominalizations in Social Studies essays and 1, 2, or 5 in Science essays, most students produced only 0-5 different nominalizations in Social Studies[8], but between 1-6 different nominalizations in Science essays. Thus, the relationship between being given nominalized curricular words and producing different nominalizations was closer to expectation in Science than in Social Studies; students produced fewer nominalizations in Social Studies despite the greater number of nominalized curricular words available to them.

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[8] Note: only one student produced 8 unique nominalizations in Social Studies, when given 10 nominalized curricular words.

Summary of Results

The following table summarizes the quantitative findings in this study.

Table 4
Summary of Results: Frequency, Accuracy, Source, and Category of Nominalizations with Proportions in Science and Social Studies Essays[9]

	Science	Social Studies
Frequency		
Essays with no nominalizations	7	11
Essays with nominalizations	41	37
Total Nominalizations (types)	166	87
Different Nominalizations (tokens)	112	82
Type/Token Ratio	.67	.94
Accuracy		
Semantically and Syntactically Accurate	140	79
Syntactically Inaccurate	22	6
Semantically Inaccurate	0	2
Semantically and Syntactically Inaccurate	4	0
Source		
Spontaneous Nominalizations	66	59
Focus Word Nominalizations	68	11
Curricular Word Nominalizations	32	17
Category		
Derivational Nominalizations	114	59
Zero-Affix Nominalizations	52	28

Essay Examples

The following is a close analysis of a selection of Science and Social Studies essays. These essays were chosen to show the range of nominalization use in frequency, diversity, source, and degree of accuracy in both content areas. Though writing quality was not assessed in this study, the essays in Tables 5-8 illustrate that higher frequencies of nominalization do not necessarily indicate more effective writing. Rather, the degree to which nominalizations are used accurately may be a better indication of effective expression in writing. In the essays appearing in Tables 5-8, spelling errors have been

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[9] Accuracy, Source, and Category were analyzed from total nominalizations (tokens)

corrected for ease of reading. However, grammatical errors have been left intact, as they are important to the analysis.

Table 5
Science Essay with Three Nominalizations

Topic: A company is building a skateboard park in your neighborhood. Should they worry about building ramps that are very steep?
Nominalized Focus Words: *claim, evidence*
Nominalized Curricular Words: *recommendation, suggestion, neighborhood*
My **suggestions** that the builders should use practice dummies to see if the steep ramp is safe or dangerous for people to skate on so people do not get injured and so it doesn't keep happening like a pattern over and over again. Also my other **suggestion** is that the builders who are building the skate park should interpret and show the mayor to see if it's ok. Also I think they should worry about because before they make the skating park they should use a dummy to see if someone gets hurt so it's plausible and they should show their results of every time they use the dummy to record their data. And they need **evidence** to show if it is safe.

The essay in Table 5 contains three derivational nominalizations two of which are different (*suggestion,* and *evidence*). The student incorporates a curricular word, *suggestion,* twice in this paper, and a focus word, *evidence.* The first usage of *suggestion* is syntactically inaccurate, as the student appears to have not used an apostrophe. Unlike most nominalizations observed in this data, where verbs are turned into nouns, the use of *evidence* in this essay is an example of a noun derived from the adjective *evident.* Again,

this may be an instance of a lexical use of the learned (focus word) *evidence*, rather than a nominalization of the adjective, but this distinction is not accounted for in this study.

Table 6
Science Essay with Five Nominalizations

Topic: What would you say to a congressman about what is involved in identifying a mystery powder?
Nominalized Focus Words: inference, contrast*[10]
Nominalized Curricular Words: recommendation, observation, difference
Dear congress man, A **observation** is when you see and notice something and a **inference** is reaching a **conclusion** about something. The reason why you have got to do careful **observations** is because the powder can be poison. It changed from what it was before when I put the stuff in. So you can learn more stuff. **Inference**, compare, substance, qualitative, quantitative, contrast.

The Science essay in Table 6 contains a total of five nominalizations, all of which are derivational, and three of which are different (*observation*, *inference*, and *conclusion*.) This student utilizes *Spontaneous* (*conclusion*), *Focus* (*inference*), and *Curricular Words* (*observation*) in the essay. Interestingly, this student integrates *inference* into the essay in a meaningful way once, but the second time this nominalization is used, it appears in a string of words at the end of the essay. This could either signal that the student has misunderstood the assignment, or was simply

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[10] An asterisk indicates that the word can only be counted as a nominalized curricular word if it is used as a noun rather than a verb.

unsuccessful in incorporating more than one *Focus Word* into the written assignment and therefore added the focus words as a list in an attempt to incorporate them into the essay.

The first nominalization, *observation* is semantically accurate, but contains a syntax error as the student uses the article 'a' instead of 'an.' The second nominalization, *inference*, also contains the same syntactical error; however, the student uses the third nominalization, *conclusion*, in a syntactically and semantically appropriate manner. When *observation* is used a second time, the student uses it in a semantically and syntactically accurate way. The incorporation of *inference* at the end of the essay is coded as both semantically and syntactically inaccurate, as it appears in a list rather than a sentence[11].

Table 7
Social Studies Essay with Three Nominalizations

Topic: The Space Program: Great achievement or a waste of our surplus wealth?
Nominalized Focus Words: [none]
Nominalized Curricular Words: *achievement, argument, claim*, debate*, quotation, waste*
I believe the space program was a monumental **waste** of our surplus because they money on earth needed for health care, **improvement** in our education system was now wasted on an architectural infrastructure that no one needs. I understand why you would think that this program would be a great **achievement** but what about having good health or being educated. Doesn't that mean more than going to space just to claim some land that no one can survive on. We do not need to waste our money just so one man to travel.

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[11] Note: Though *contrast* is listed as a potential nominalized focus word, it not coded as a nominalization because it is unclear whether the student intended to use it as a noun or a verb.

The essay in Table 7 contains two different derivational nominalizations: *improvement* and *achievement*, and a zero-affix nominalization, *waste.* Two of these nominalizations are curricular (*achievement* and *waste*), while one is spontaneous (*improvement*). Though the essay contains some grammatical errors, this student has used these nominalizations accurately throughout the essay. One can argue that *education* should be considered a nominalization as this noun is perhaps more common than its verb form, *educate*. Though this study generally does not distinguish between nominalizations that are more or less common in noun or verb form, in this instance, this word is used as an adjective (*education system*); thus, it is not coded as a nominalization.

Table 8
Social Studies Essay with Two Nominalizations

Topic: Would You Rather Live in Athens or Sparta?
Nominalized Focus Words: *democracy, oligarchy, competition, allegiance, individualism, conformity*
Nominalized Curricular Words: *argument, debate*, claim*, quotation*
I would like to live with Sparta. I like the fact everyone is treated equally and they die for Sparta with pride. Spartan woman have more **control** property. Where woman in the Athens are weak and have none. In Greece woman had few rights. In Sparta woman have **control** over their homes. At the age of 7 boys go and get trained to be soldiers. I think it's good to start young so they are better soldiers when they are older. I also like that woman do not fight. I think men should and not woman and that is how it is in Sparta. Sparta woman feel sorry for Athenian woman.

Table 8 contains two nominalizations of the same word, *control*, a spontaneous, zero-affix nominalization. In the first instance, the student used *control* in a semantically accurate way, but displays a syntactical error (in this case, the student writes "have more control property" rather than "have more control over their property.") The second usage of *control* is both semantically and syntactically accurate and the sentence follows a similar structure to the sentence in which the first instance of *control* is contained. This inconsistency is therefore not an indication that the student is unable to use this nominalization in a syntactically accurate way; rather, this may be a case of an unrevised error, or an indication of nominalization as an emerging skill. It is noteworthy that this student did not use any of the six nominalized focus words he/she was explicitly encouraged to include in this essay, nor did the student include any of the four possible curricular words at his/her disposal. Instead, this student uses a spontaneous nominalization, which was likely acquired through reading materials in this unit.

The essays in Tables 5-8 display a range of nominalizations used in Science and Social Studies essays. As shown, students utilize both spontaneous and curricular nominalizations, though they sometimes do not produce any of the nominalized curricular words available to them (e.g. Table 8). Also, the quality of the essay does not always appear to be enhanced by the use of more nominalizations (e.g. although the essay in Table 6 contained a higher number of nominalizations compared to the essay in Table 5, the ideas communicated were not as clear as those in Table 5).

VI.   **Discussion and Limitations**

The present study examined the frequency, source, category, and accuracy of nominalized words produced by sixth grade students attending urban middle schools in the Northeastern U.S. Students produced persuasive essays on a variety of Science and Social Studies topics (Tables 1 and 2). As nominalization is considered one of the more difficult features of academic language, it is hypothesized to develop in the upper grades, once students have achieved relative proficiency in writing (Nagy and Townsend, 2012). In this study, perhaps the absence of nominalizations in 18.75% of the overall sample is most indicative of the difficulty associated with producing nominalizations. Despite the absence of nominalizations in 14.58% of Science essays and 22.92% of Social Studies essays, the majority of essays displayed nominalizations, with an average of 3.46 nominalizations in Science essays and 1.81 nominalizations in Social Studies essays. Moreover, the vast majority of nominalizations were both syntactically and semantically accurate, which suggests that students were developing the skills necessary to produce nominalizations correctly in writing, even for forms that were not specifically taught.

Given that nominalizations can create abstraction in language (Fang, Schleppegrell & Cox, 2006), it was hypothesized that students would produce more nominalizations to write about topics related to science, which can be more abstract. Results confirmed this hypothesis. Students produced statistically significantly more nominalizations in Science than in Social Studies in this sample. Furthermore, there were fewer Science essays with no nominalizations, which is also indicative of the greater prevalence of nominalizations in Science essays, as shown in previous studies (Biber & Gray, 2013).

The goal of this study was to produce a more nuanced explanation of the content-area differences observed in the written production of nominalizations among novice writers of academic discourse. Thus, this study not only analyzed the total frequency (tokens) of nominalizations produced, but also studied the diversity (types) of nominalizations in each content area. In addition, to situate the production of nominalizations in their specific curricular context, the nominalizations produced were analyzed in relation to each unit's focus words and curricular words. When the number of different nominalizations (types) was compared across content areas, the statistical difference did not persist. Given that the difference was approaching statistical significance, a larger sample of essays will most likely show a statistical difference between nominalized types as well. Also, there was a higher type-token ratio for nominalizations in Social Studies essays than Science essays, reflecting that while students used fewer tokens and types of nominalizations in Social Studies, they did not tend to use the same nominalization twice in Social Studies essays ($TTR_{SS} = .94$). Conversely, students often repeated the nominalizations they produced in Science essays to generate the high number of nominalization tokens ($TTR_S = .67$).

One possible explanation for this finding is that Social Studies essays contained between four and 10 nominalized focus and curricular words available to students, whereas Science essays contained between one and five nominalized words from the curriculum. Thus, though Social Studies essays contained fewer total nominalizations, students had more options of nominalized words from which they could select for inclusion in their essays.

What is most surprising is that students writing Social Studies essays did not produce as many total nominalizations despite the availability of more nominalized curricular words, some of which they were explicitly encouraged to include in their essays (i.e. nominalized focus words) (Figure 5). Perhaps this is an indication that, like adult writers, sixth grade students in this sample were already aware of the need to nominalize when writing about science. Further research investigating the content-specific uses of nominalization is needed to further understand the differences found in this study.

This study revealed that when students used nominalized words in their essays, they did so with a very high level of semantic and syntactic accuracy (over 80%) in both content areas. Furthermore, the results show that students are applying the curricular words they are expected to use as part of the curriculum described in this paper, especially in Science, where students used slightly more curricular words (60.24%) than spontaneous nominalized words. In comparison, only 32.18% of the nominalizations produced in Social Studies essays were curricular words, as students relied more heavily on spontaneous nominalizations in Social Studies.

An area not addressed in this paper is the psycholinguistic status of nominalizations. While this study identified nominalized terms in students' essays, it is unclear whether all instances were actual attempts at nominalizing. That is, students may have been using nominalizations with or without understanding of their morphological structure. In some instances, where the nominalized form of a word is much more common than its base form (e.g. *conversation*), the use of the nominalized form does not necessarily signal a student's awareness of nominalization as a grammatical resource.

These students' use of nominalizations is different from those who are aware of the base form and are intentionally utilizing its nominal form for certain purposes. To illustrate, students in this sample were using the word *model* frequently in Science units 2, where the word was a Focus Word, and in unit 3, where it was a Curricular Word. However, it was clear that students were taught the word as a nominal and in all instances, produced it as a noun rather than a verb. Inclusion of this word would have significantly altered the results of this study, and given that is was evident that students were not in fact, nominalizing, *model* was excluded from the analysis. Further research could attempt to differentiate between students' use of learned nominals and actual nominalization by attempting to identify words that are commonly taught as nominals (though they appear in nominalized form) at the grade level (or classroom) in question.

Though students are learning to produce nominalizations in both content areas examined, it is unclear whether nominalizations contribute to the overall writing quality of essays. Neither the current study nor previous research addresses this relationship. In light of the arguments against the use (or overuse) of nominalizations, future research could examine a larger sample, which will allow for statistical analysis of the relationship between nominalization and overall essay quality, while controlling for demographic variables and overall writing quality scores. Using writing score as an outcome variable, regression analyses could shed light on the predictive value of nominalizations on writing quality, by content area. Also, the absence of nominalizations in some essays at this age group provides an opportunity for future research to compare their prevalence at higher grades.

An area not addressed in this study is comparing native and non-native speakers of English in their use and comprehension of nominalizations. Given that differences among adult native and non-native speakers of English in their use of abstract and concrete nominalizations have been found (Terblanche, 2009), as well as differences in recall of texts containing different levels of nominalization (Spyridakis & Isakson, 1998), future research could examine how writers and readers of various degrees of English proficiency utilize and comprehend nominalization in texts.

When we do not explicitly teach students how to write academically, we perpetuate the "pedagogy of entrapment," whereby students are required to engage in academic skills that we do not teach (Macedo, 1994, p.34). This can manifest itself in expecting students to "write more clearly," without communicating the mechanisms to achieve such clarity. Overall, a more nuanced understanding of how young writers use linguistic features of academic language such as nominalizations in their writing will help draw teachers' attention to the various components of writing that help students meet the increasingly complex writing demands in middle and high school.

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Appendix A: Coding Scheme and Examples

	NAME	CLAN CODE	DESCRIPTION
SOURCE	Spontaneous Nominalizations	$SPO	Spontaneous nominalizations by the student (i.e. nominalized words learned independently or as part of the larger curriculum)
	Focus Words	$FW	Nominalized focus words in the current unit
	Curricular Words	$CW	Nominalized words appearing on students' worksheet (e.g. in the prompt)
CATEGORY	Derivational Nominalizations	DER	Nominalizations created through the addition of derivational suffixes (e.g. –tion, -sion, -ness, -ence)
	Zero-affix Nominalizations	0AF	Nominalizations created without morphological changes (i.e. verbs used as nouns.)
ACCURACY	Semantically and Syntactically Accurate	SSA	The nominalization is used conventionally within the sentence
	Syntactically Inaccurate	SYN	The nominalization is semantically accurate but is not used in a syntactically conventional manner within the sentence
	Semantically Inaccurate/Unclear	SEM	The nominalization is syntactically conventional, but its use reflects the students' lack of understanding of its meaning
	Semantically and Syntactically Inaccurate	SSI	The nominalization is used unconventionally (on a syntactic and semantic level) within the sentence

Appendix B: Coding Examples

*STU: but in Sparta women had greater control in their homes.
%nom: $SPO:control:0AF:SSA

> This sentence contains one zero-affix nominalization, *control*, which is a spontaneous nominalization and has been used accurately within this sentence.

*STU: I would be able to test how pollution.
%nom: $SPO:pollution:DER:SYN

> The student produced a spontaneous, derivational nominalization, *pollution*. However, although it's clear from the context of the essay that the student understood the meaning of the word, he/she did not use it in a syntactically appropriate way within this sentence.

*STU: it is important to make several observations before making an inference about the

                substance.
%nom: $CW:observations:DER:SSA $FW:inference:DER:SSA

> This student produced a curricular nominalization, *observations* and a focus word nominalization, *inference.* In both instances, these nominalizations are derivational and they are used accurately within this sentence.