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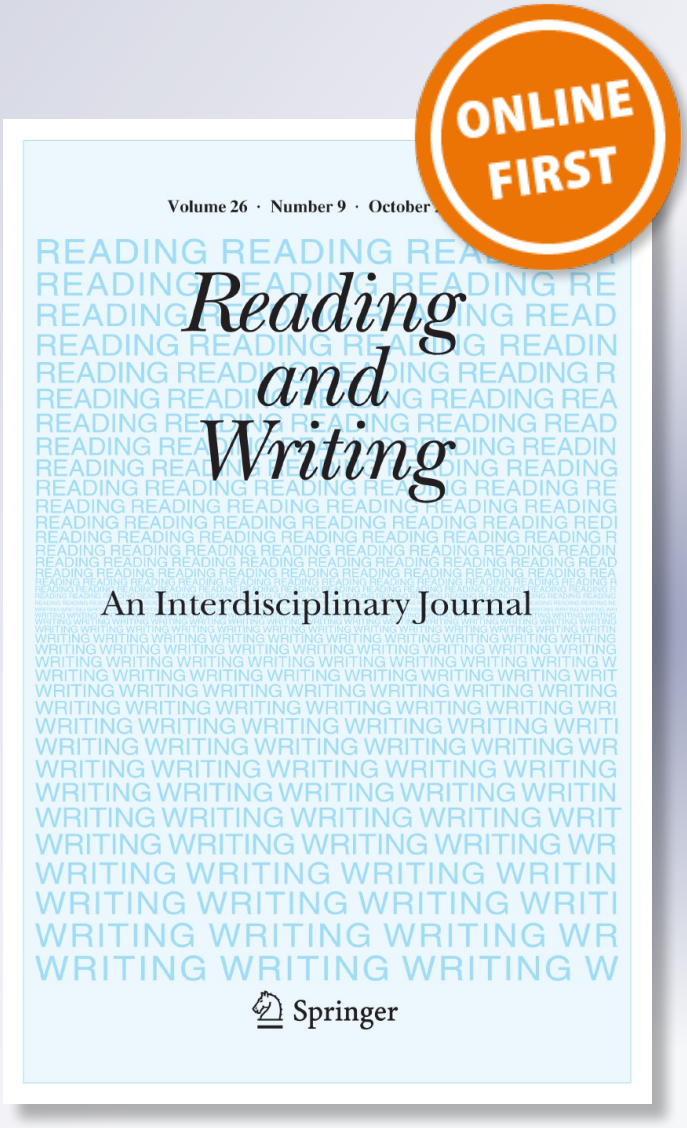

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The nature of error in adolescent student writing

Kristen Campbell Wilcox · Robert Yagelski · Fang Yu

Abstract This study examined the nature and frequency of error in high school native English speaker (L1) and English learner (L2) writing. Four main research questions were addressed: Are there significant differences in students' error rates in English language arts (ELA) and social studies? Do the most common errors made by students differ in ELA and social studies? Are there significant differences in the error rates between L1 and L2 students in ELA? Do L1 and L2 students differ in how frequently they make the most common errors in ELA? Written work of 10th and 12th grade students in five states was collected. The sample included 178 essays (120 in ELA and 58 in social studies) from 67 students (33 10th graders and 34 12th graders; 49 native English speaking students and 18 English learners). Results indicate that there were significant differences in the frequencies of errors between ELA and social studies, with higher error rates in social studies. In addition, L2 writers had significantly higher error rates than L1 writers in ELA. Aside from a few types of errors (spelling, capitalization, and some punctuation errors), most types of errors appear relatively infrequently in school-sponsored writing. Moreover, the eight most common errors accounted for a little more than half of all errors, and these did not differ significantly between ELA and social studies writing or between L1 and L2 writers.

Keywords Content-area writing · Error · Adolescent literacy · English language learners

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Introduction

The identification, correction, and remediation of formal error in student writing is a mainstay of conventional writing instruction in schools. Errors in a composition influence perceptions of the quality of ideas in a paper (Graham, Herbert, & Harris, 2011; Kiuhara, Graham, & Hawken, 2009) and potentially impede meaning. Countless books, articles, instructional materials such as worksheets, and more recently, computer programs and online resources are devoted to helping students correct errors in their writing and aid teachers in helping students avoid error. Standardized writing tests, including college admissions tests like the SAT, almost always include some version of "correctness" or adherence to the conventions of standard edited American English in their scoring procedures. The Common Core State Standards (CCSS) for writing, now adopted by all but five states, require students to "demonstrate command of the conventions of standard English grammar and usage when writing or speaking," which encompasses such skills as "ensur[ing] that pronouns are in the proper case," using proper punctuation, and spelling correctly (New York State Common Core Learning Standards, p. 68). If encouraging correctness has always been a central part of writing instruction, it remains so today. Indeed, as the Common Core standards and the growing emphasis on state-mandated writing tests begin to influence classroom instruction, remediating error might well play an ever-greater role in writing pedagogy in secondary classrooms.

Error in writing, however, is poorly understood, and no consensus has emerged about how to approach error in writing instruction or even whether error constitutes a serious problem in the development of writing ability. Indeed, there is often no consensus about whether a particular error actually constitutes a mistake, a deviation from convention, or a developmentally appropriate construction. Many studies suggest that many first-year college students perform poorly on college-level writing tasks and that high school graduates new to the workforce lack requisite writing skills (Graham & Perin, 2007; Knudson, Zitzer-Comfort, Quirk, & Alexander, 2008; National Commission on Writing, 2003), but the extent to which formal error correlates with poor writing is unclear. The Common Core movement, with its goal of ensuring that students are "college and career ready," has rekindled the interest of policymakers and the public in students' writing ability. Part of the CCSS for writing focuses explicitly on conventions and usage, reflecting longstanding assumptions about the importance of correctness in writing quality. But despite this ongoing attention to correctness in writing, little research has examined the nature and frequency of error in the writing of mainstream adolescent students. The present study was undertaken with this gap in mind.

The purpose of this study was to describe the nature of formal error in the writing of a diverse sample of adolescent students. Our findings illuminate the nature of error in adolescents' school-sponsored writing. Perhaps more important, our study underscores the complexity of error and raises some provocative questions about the attention given to error in writing instruction.

Why study error?

In 2012 the CEO of two successful technology companies, Kyle Wiens, wrote an essay for the *Harvard Business Review* titled "I Won't Hire People With Poor Grammar. Here's Why." Wiens begins his essay in stark fashion:

> If you think an apostrophe was one of the 12 disciples of Jesus, you will never work for me. If you think a semicolon is a regular colon with an identity crisis, I will not hire you. If you scatter commas into a sentence with all the discrimination of a shotgun, you might make it to the foyer before we politely escort you from the building. (para. 1)

Wiens goes on to connect knowledge of grammar explicitly to job performance—and implicitly to character:

> Grammar signifies more than just a person's ability to remember high school English. I've found that people who make fewer mistakes on a grammar test also make fewer mistakes when they are doing something completely unrelated to writing—like stocking shelves or labeling parts. (para. 10)

That there is no empirical support for the claim that "grammar mistakes" in writing correlate to problems in job performance, such as stocking shelves, is less important than the fact that the views Wiens expresses about the importance of correctness in writing are widely shared–among educators, policymakers, and the public in general.

These attitudes about the importance of "good grammar" and the perceived connection between grammar instruction and "good" writing continue to influence the public debates about reform in literacy education, despite the preponderance of research over the past half century showing that, as Hillocks (1986) notes in his extensive meta-analysis, "grammar study has little or no effect on the improvement of writing" (p. 225). Hillocks' findings were corroborated, with a notable nuance, in a more limited meta-analysis released in 2007 by Graham and Perin. They found that direct or traditional grammar instruction had a negative effect on students' writing quality; however, alternative methods of grammar instruction, such as sentence-combining, showed positive effects on writing quality, and one study (Fearn & Farnam, 2005) found that teaching grammar in the context of students' own writing had positive effects on writing quality (Graham & Perin, 2007, p. 21). Nevertheless, the notion that "good grammar" equates to good writing remains strong. Findings from some studies point to the importance placed on formal error in the assessment of writing quality (Graham, Harris, & Hebert, 2011; Kiuhara, Graham, & Hawken, 2009), and the results of the most recent national survey of teachers' writing practice, revealed that English teachers believe that correcting errors in usage in mechanics is important or very important (Applebee & Langer, 2013). Perhaps as a result, correctness—or conversely, the avoidance of error—is disproportionately valued in much writing instruction, particularly in English language arts (ELA) classrooms. A better understanding of the nature and frequency of error in student writing would help educators place formal error in perspective and could inform the development of more effective methods of addressing error in

student writing. A better understanding of error might also lead to a careful review of the usefulness of traditional methods, such as "correcting" student papers or assigning "grammar" worksheets that continue to be a common component of mainstream writing instruction.

In addition, despite a seemingly consistent concern with error and "good grammar" over time, surprisingly little is known about the nature, frequency, and potential causes of error in the writing of adolescent students. The research that has focused on error in adolescent student writing has largely examined the writing of special needs students or students whose first language is other than English. Although such research can provide some insight into the nature of error in adolescent student writing, the specific kinds of difficulties faced by special needs students and second-language writers can differ significantly from those of mainstream students and students whose are native English speakers. Consequently, the usefulness of this body of research for understanding error in adolescent student writing in general is limited.

Finally, the more we can learn about error in student writing, the more likely it is that we can understand the complexities of the development of writing competence in adolescents and the better we can meet the challenges of developing effective methods of teaching writing. Gaining insight into the nature and frequency of error in adolescent student writing has the potential to challenge longstanding and resilient attitudes about the role of error in student writing development and the importance of error (or lack thereof) in writing quality.

Related literature

Several large-scale studies in the past 100 years or so have investigated error in writing. The majority of these studies have examined specific types and frequency of errors in first-year college students' writing. Despite some differences, these studies "yield remarkably similar findings" in terms of the kinds of errors college students tend to make in their writing (Lunsford & Lunsford, 2008, p. 800). Moreover, the rate of error in student writing across these studies is strikingly stable. The most recent of these studies, in which a random stratified sample of 877 student essays was analyzed for specific kinds of formal errors, found a rate of 2.45 errors per 100 words, compared to rates of 2.11, 2.24, and 2.26 in three previous studies conducted between 1917 and 1988, one of which included analysis of 3,000 student essays (Lunsford & Lunsford, 2008, p. 800). The researchers conclude that "the rate of student error is not increasing precipitously but, in fact, has stayed stable for nearly one hundred years…. [S]tudent errors are not more prevalent—they are only *different*" (Lunsford & Lunsford, 2008, p. 801).

Numerous smaller-scale studies have examined various aspects of error in the writing of college students. For example, Sloan (1990) compared errors in the writing of twenty first-year college students and twenty professional writers, finding that "[t]he distribution of errors in the students' writing is consistent with figures from previous studies" (p. 302). Cook (2010) used the methods described in Lunsford and Lunsford (2008) to analyze 180 essays written by students in first-year

writing courses at her university and found that her students "make the same sorts of errors at roughly the same rates as students nationwide" (p. 23). Haswell (1988) analyzed 128 impromptu essays written by first- second-, and third-year college students and by post-graduates in workplace settings for eight types of "surface" error and found that error rates per 1,000 words were stable for most of these error types. Although it is difficult to generalize from these studies, it is reasonable to conclude that the frequency of error in college student writing has remained relatively stable over many years, even if relative rates of specific kinds of errors have changed. Moreover, the lack of a consistent and widely accepted definition of error undermines any effort to draw broad conclusions from this body of research. As Cook notes, "Whether or not something is an error—a comma splice, say—depends on the contexts within which it occurs" (p. 23). Haswell (1988) and Williams (1981) make a similar point.

As noted earlier, there has been comparatively more research on error in the writing of native English-speaking college students, yet there have been a few studies of second language learners (L2) (Horner, 1994; Janzen, 2008; Taniguchi, 1990). However, this research tends to focus on comparing linguistic features between a student's L1 and L2 and how errors patterns relate to what is characterized by some as second-language interference and by others as interlanguage (Kramsch & Whiteside, 2007). Moreover, although findings from such studies can illuminate the nature of error in L2 writing as it relates to L1 background and perhaps identify some of the patterns typical of students with different native language backgrounds and literacy experiences, how error patterns among adolescent L2 student writers compares with L1 (native English) has not been investigated at the time of this study. Like the research on error in L2 writing, studies of the writing of special needs student provide limited insight into adolescent writing error in general, since many of these studies focus on elementary students and on the strategies and interventions targeted to special needs students specifically rather than on the qualities of the writing itself (Graham, Harris, Fink-Chorzempa, & MacArthur, 2003; MacArthur & Graham, 1987; Sandmel, et al., 2009; Stotz, Itoi, Konrad, & Alber-Morgan, 2008).

In the end, little research has focused specifically on the nature of error in the school-sponsored writing of mainstream adolescent students, including the growing population of second language learners, who make up over 10 % of the student population in U.S. schools. One possible reason for this lack of research is the complexity of error. Barksdale-Ladd and King (2000) note, "Because there are specific rules for writing, it would seem reasonable to assume that the identification of errors in writing is a fairly straightforward process. It is not" (p. 356). Disagreement exists about the rules and conventions governing usage, which change over time. In addition, the identification of error is largely a function of context, as we noted earlier. Which errors teachers identify in a student's writing and how those errors are defined can be shaped by teachers' conceptions of the instructional situation as well as by a variety of social, cultural, institutional, and historical factors (Williams, 1981). In other words, error in writing is as much a social matter as it is a matter of technical skill or cognitive ability. It is also a matter of

perspective—that is, who is perceiving the error and who is making it. As Cook (2010, p. 25) points out,

> Error is in texts; in writers, or rather in their processes and intentions; and in audiences and their ways of reading. The flawed exchanges that constitute the rhetorical situation of error also exist within institutional, cultural, and social structures, which exert considerable influence on the three determining angles of the rhetorical triangle.

We undertook the present study with these complexities in mind and in light of the continued importance assigned to correctness in writing by educators and the public at large. We investigated the nature of error in adolescents' school-sponsored essays. Because, as we have noted, most research on formal error in writing has focused on native-English-speaking college students or on elementary and secondary special needs students and English learners, we selected a varied sample of adolescents' writing from different content areas and grade levels; our sample also included writing by both native English speakers and English language learners. The following four questions guided this study:

> Question 1: Are there significant differences in students' error rates in ELA and social studies?
> Question 2: Do the most common errors made by students differ in ELA and social studies?
> Question 3: Are there significant differences in the error rates between L1 and L2 students in ELA?
> Question 4: Do L1 and L2 students differ in how frequently they make the most common errors in ELA?

We know from the few studies investigating adolescents' writing that secondary school teachers tend to emphasize feedback on mechanics and usage errors more than on any other aspect of students' writing and that this is particularly true in ELA classrooms (Applebee, Lehr, & Auten, 1981; Harris, 1977; Searle & Dillon, 1980; Rosen, 1987). We also know from the research that adolescents' writing is more likely to be of higher quality if they are able to craft multiple drafts, which is also more common in ELA than in other content areas (Graham & Perin, 2007). This may result in fewer errors in ELA classes, as students in them may have more opportunities to correct their errors than students in other content classes. Based on such findings, we expected students' essays in ELA to have fewer errors than in social studies and that the types of errors in social studies writing might differ from those in ELA, primarily in wrong words and capitalization (due to the use of less familiar vocabulary and frequent use of proper names), punctuation, and sentence structure (due to the need to craft complex arguments and compare and contrast historical sources). Furthermore, since many adolescent L2 writers have not yet developed native-like academic vocabulary, register, and syntax (Horner, 1994; Ferris, 2004; Janzen, 2008; Taniguchi, 1990), we expected to see more errors in their writing as compared to L1 writers; furthermore, we expected that these errors would include wrong words (e.g. prepositions), spelling, article usage, verb form, plural and possessives, and sentence structure errors (e.g. run-ons). However, given

the paucity of research on rates of error in adolescent writing, we could only anticipate that the frequency of specific types of errors we would identify in the adolescent student writing in our sample would likely be less than what researchers have found in college student writing (Lunsford & Lunsford, 2008).

Method

Sample

To address these questions, we drew on a sample of student writing collected for the National Study of Writing Instruction, conducted by our colleagues Arthur Applebee and Judith Langer, which focused on the nature of writing instruction across the disciplines in a national sample of middle and high schools (Applebee & Langer, 2009, 2011, 2013). Participants in that study represented 10 high schools in 5 states selected on the basis of geographic distribution and diversity in populations (California, Kentucky, Michigan, New York, and Texas). The schools represented a wide range in school size (340–4,632), percent of minority students (6–99 %), students eligible for free or reduced price lunch (14–83 %), and percent of English Language Learners (0–34 %). At each school site focal students were selected in grades 10 and 12 by English teachers to represent native English speaking (L1) students as well as English language learners (L2) as designated by state or district procedures. All the writing completed by these students in all their classes was collected over an entire school year.

For our sample, we selected essays written by 10th and 12th grade students for their ELA and social studies classes. We defined "essay" as a piece of extended writing that was completed as part of a course assignment. We excluded impromptu in-class writing, short prompted responses to readings or teacher-provided questions, and writing that was done on essay exams. Because of the limited amount of writing students were asked to do in math and science classes, those disciplines were excluded from our study. Also, because the extent of the writing students were asked to do varied significantly from one school to another, including all the English and social studies writing done by each student would have resulted in a skewed sample of essays, with some students accounting for a disproportionately high number of the essays. As a result, we limited our sample to two essays from each student in each discipline (ELA and social studies). In a number of cases, an essay was eliminated during coding because it was illegible or otherwise determined to be uncodable. This resulted in odd numbers in some categories in which some students had only one essay coded (instead of the two we planned to code for each essay). In addition, for some students no essays in social studies were available because the only writing they were asked to do in those classes was on worksheets or short-answer essay exams. Our sample broke down as follows:

In the end, we collected 178 separate essays for coding (120 in ELA and 58 in social studies) from 67 students (33 10th grade students and 34 12th grade students; 49 L1 students and 18 L2 students; 28 males and 39 females) (Table 1).

Table 1 Data sources

	10th ELA	12th ELA	10th SS	12th SS
L1 essays	42	47	34	13
L2 essays	14	17	5	6
Total essays	56	64	39	19

Scoring procedure

The 178 student essays in the final sample were analyzed for types and frequencies of formal error using a coding instrument developed from instruments used in previous studies of first and second language writing (Ferris, 2002; Hartshorn, Evans, Merrill, Sudweeks, Strong-Krause, & Anderson, 2010; Lunsford & Lunsford, 2008). We developed the instrument using a method similar to the procedure described by Lunsford and Lunsford (2008). First, one of the researchers reviewed a random sample of 12 papers for errors of punctuation, usage, syntax, and spelling. Every error in each paper was identified and categorized. This process resulted in a list of error categories similar to the one developed by Lunsford and Lunsford (2008); however, some minor adjustments were made to Lunsford and Lunsford's list to accommodate specific kinds of errors that appeared in our sample and to ensure that every error we identified could be categorized.

A coding instrument was developed on the basis of this list and tested on a small sample of essays with eight practicing English teachers who were recruited for the purpose. Each teacher coded the essays in the test sample. The results were tabulated, and specific examples of errors were discussed by the group when differences arose in how individual teachers had coded the errors. The instrument was adjusted as a result of this testing session; some categories were combined, others were added, and several were refined. Definitions and examples of each kind of error were developed (see "Appendix"). The team of eight coders then coded the full sample of 178 essays with an additional 20 duplicate essays integrated into the sample. These duplicates were dispersed among the coders to check inter-rater agreement, which was 88 %. Each coder coded approximately 25 essays during several coding sessions. During the coding sessions, questions about specific errors were addressed by consulting with the two lead researchers.

It is important to note that since our sample included only 30 students with essays in both ELA and social studies, the analysis for questions one and two (regarding differences in error rates per 100 words and types of error in these subjects) was conducted on this subsample. For questions three and four, social studies writing was not investigated due to the small number of students who produced work in this subject area. For these questions, we focused only on ELA and analysed the entire corpus of 67 students' work.

Results

As noted earlier, 30 tenth and twelfth grade students produced compositions in their ELA as well as their social studies classes. Data for these 30 students were used to

answer questions one and two, which examined differences in error rates across disciplines. Before conducting the analyses for these two questions, we first examined whether the number of errors per 100 words was related to students' grade and gender. Using a Two-Way ANOVA, we found that the main effects for grade and gender as well as the interaction between the two were not statistically significant (all p's $> .14$). Thus, neither grade nor gender was used in any subsequent analyses for questions two and three.

To answer questions three and four, which examined differences in error rates for L1 and L2 students, we employed data from 64 students who wrote compositions in ELA classes. This analysis included essays from the 30 students mentioned above (who had essays in both ELA and social studies). It did not include data from students' social studies papers, as the number of L2 students in this group was small. Prior to conducting the analyses for questions three and four, we again examined whether number of errors per 100 words for the 64 ELA students was related to grade and gender. Using a Two-Way ANOVA, we found that the main effects for grade and gender as well as the interaction between the two were not statistically significant (all p's $> .25$). Thus, neither grade nor gender was used in any subsequent analyses.

Question 1: Are there significant differences in students' error rates in ELA and social studies?

The mean number of errors per 100 words made by the 30 students in their ELA class was 5.34 ($SD = 3.91$), whereas an average of 7.14 ($SD = 5.82$) errors per 100 words was made in social studies classes. A t test for dependent means found that students made significantly more errors in social studies classes than ELA classes ($t = -2.59$, $df = 29$, $p = .02$).

Question 2: Do the most common errors made by students differ in ELA and social studies?

Table 2 presents the mean, standard deviation, and percent of overall errors for each error category for ELA as well as social studies. Errors are arranged from most frequent for all 30 students to least frequent.

Eight types of errors accounted for 55 % of all errors in the ELA essays and 59 % in the social studies essays (and 58 % of errors in the full sample): spelling, capitalization, missing comma after introductory element (such as a clause or phrase), incorrect or inappropriate word, incorrect verb inflection, missing word, inappropriate or missing punctuation, and wrong form of the word. No single error type accounted for more than 10 % of total errors, and the majority of error types (30 of 39 error types) each accounted for fewer than 5 % of total errors. In general, these errors encompassed the broader categories of spelling, diction, mechanics, punctuation, and usage. Spelling might constitute a special case (which we discuss below), but for the most part these errors are relatively minor surface errors that do not necessarily reflect a lack of understanding of or facility with the fundamental conventions of standard written English.

Table 2 Means, standard deviations, and percent of most common errors in ELA and social studies

Item	ELA			SS		
	M	SD	%	M	SD	%
Spelling error	2.07	2.96	9	2.68	4.2	10
Capitalization error	1.82	2.41	8	2.18	2.86	8
Missing comma after introductory element	2.07	3.62	9	1.73	2.67	7
Incorrect or inappropriate word	1.34	1.38	6	2.05	2.26	8
Incorrect verb inflection	1.45	3	6	1.92	3.95	7
Missing word	1.33	1.35	6	1.68	1.76	6
Inappropriate or missing punctuation	1.18	2.34	5	1.15	3.25	7
Wrong form of the word	1.26	1.94	6	1.53	1.66	6
Unnecessary word	1.09	1.25	5	0.87	1.27	3
Incorrect singular or plural	0.98	2.61	4	0.93	1.63	4
Run-on (or fused) sentence	0.72	0.99	3	1.03	1.67	4
Missing comma before coordinating conjunction	0.62	1.01	3	0.78	1.34	3
Missing comma around parenthetical elements or appositives	0.63	0.86	3	0.72	1.11	3
Unnecessary comma separating sentence elements	0.56	0.69	2	0.58	0.73	2
Comma splice	0.56	1.3	2	0.57	1.08	2
Subject-verb agreement	0.5	1.05	2	0.4	1.05	2
Missing comma(s) in a series	0.58	1.9	3	0.28	0.47	1
Unnecessary or missing apostrophe	0.28	0.86	1	0.55	1.52	2
Article error	0.56	1.13	2	0.25	0.7	1
Missing or unnecessary hyphen	0.47	1.2	2	0.23	0.41	1
Missing comma with non-restrictive element	0.3	0.69	1	0.4	0.58	2
Fragment	0.25	0.52	1	0.43	0.72	2
Vague pronoun reference	0.35	1.29	2	0.28	0.93	1
Incorrect or missing preposition	0.32	0.53	1	0.2	0.41	1
Faulty sentence structure	0.27	0.43	1	0.2	0.36	1
Incorrectly used semi-colon	0.12	0.47	1	0.33	0.79	1
Incorrect possessive	0.17	0.28	1	0.28	0.68	1
Others	0.27	0.77	1	0.08	0.3	0
Unnecessary comma with a restrictive element	0.13	0.45	1	0.18	0.55	1
Missing comma before a quotation	0.05	0.2	0	0.23	0.52	1
Misplaced or dangling modifiers	0.13	0.56	1	0.13	0.22	1
Incorrect or missing colon	0.2	0.47	1	0.05	0.2	0
Faulty pronoun agreement	0.07	0.25	0	0.18	0.38	1
Then/than	0.12	0.41	1	0.08	0.19	0
Missing semi-colon	0.1	0.28	0	0	0	0
Affect/effect	0.08	0.23	0	0	0	0
You're/your	0	0	0	0.05	0.15	0
Unnecessary shift in person	0	0	0	0.02	0.09	0
Its/it's	0	0	0	0.02	0.09	0

To determine if there were statistically significant differences among the eight most common errors, we conducted eight separate Repeated Measure ANOVAs. For each of these analyses, students' errors in ELA and social studies served as the repeated measure. Across all eight analyses, there were no statistically significant differences among the eight most common errors in the two disciplines (all p's $> .07$).

Question 3: Are there significant differences in the error rates between L1 and L2 students in English language arts?

The mean number of errors per 100 words made by the 47 LI students in ELA was 4.07 ($SD = 3.19$), whereas an average of 6.95 ($SD = 4.02$) errors per 100 words were made by 17 L2 students in ELA. A One-Way ANOVA, comparing L1 and L2 students' mean error rate per 100 words yielded a statistically significant difference between the two types of students ($F = 8.86$, $df = 1, 62$, $p = .004$). Thus, L2 students made more errors than L1 students.

Question 4: Do L1 and L2 students differ in how frequently they make the most common errors in English language arts?

Table 3 presents the mean, standard deviation, and percent of overall errors for each error category for L1 and L2 students ELA classes. Errors are arranged from most frequent for all 64 students to least frequent.

Eight errors (the same as those found in the previous analysis of ELA and social studies writing) accounted for 57 % of all errors in L1 students' writing in this sample and 60 % of all errors in L2 students' writing. (As we note above, the sample for questions 3 and 4 included only ELA writing, whereas the sample for questions 1 and 2 included both ELA and social studies writing.) These eight errors were spelling, capitalization, missing comma after introductory element, incorrect word, incorrect verb inflection, missing word, inappropriate or missing punctuation, wrong form of word. No single error type accounted for more than 13 % of total errors, and the majority of error types (30 of 39 error types for L1 students and 31 of 39 error types for L2 students) each accounted for fewer than 5 % of total errors. As in the analysis for question 1, the most common eight errors in this analysis encompassed the broader categories of spelling, diction, mechanics, punctuation, and usage.

To determine if there were statistically significant differences between the eight most common errors, we conducted a One-Way MANOVA, with type of student (L1 vs L2) as the independent variable and scores for the eight errors as the dependent variables. There was no statistically significant difference in the pattern of the eight errors between the two groups of students (Wilks Lamba, $F = 2.09$; $df = 8, 55$, $p = .053$).

Discussion

This study illuminates the nature and frequency of errors in high school student writing, perhaps challenging some common perceptions about the quality of student

Table 3 Means, standard deviations, and percent of most common errors in ELA for L1 and L2 writers

Item	L1			L2		
	M	SD	%	M	SD	%
Spelling error	2.11	3.71	11	4.23	4.91	13
Incorrect verb inflection	1.31	2.14	7	3.91	5.12	12
Capitalization error	1.43	1.99	7	2.41	3.19	8
Missing word	1.4	2.18	7	1.97	1.57	6
Incorrect or inappropriate word	1.44	1.82	7	1.82	1.78	6
Missing comma after introductory element	1.35	1.84	7	1.38	2.85	4
Inappropriate or missing punctuation	1.77	1.98	6	1.71	3.47	5
Wrong form of the word	0.93	1.15	5	1.94	1.92	6
Run-on (or fused) sentence	0.64	0.96	3	1.32	1.97	4
Incorrect singular or plural	0.54	0.68	3	1.47	2.25	5
Unnecessary word	0.79	1.11	4	0.68	0.64	2
Unnecessary comma separating sentence elements	0.71	1.42	4	0.42	0.54	1
Faulty sentence structure	0.36	0.87	2	1.3	1.65	4
Missing comma before coordinating conjunction	0.46	0.83	2	0.94	1.98	3
Comma splice	0.48	1.1	2	0.79	1.16	3
Missing comma around parenthetical elements or appositives	0.68	1.02	3	0.18	0.35	1
Unnecessary or missing apostrophe	0.38	0.97	2	0.79	1.97	3
Incorrect or missing preposition	0.26	0.46	1	0.79	1.25	3
Fragment	0.31	0.61	2	0.59	0.75	2
Missing comma before a quotation	0.43	0.98	2	0.12	0.28	0
Missing comma with non-restrictive element	0.3	0.56	1	0.29	0.56	1
Article error	0.13	0.32	1	0.65	1.42	2
Subject-verb agreement	0.18	0.37	1	0.47	1.33	1
Unnecessary comma with a restrictive element	0.17	0.45	1	0.44	0.77	1
Vague pronoun reference	0.22	0.77	1	0.29	0.75	1
Missing or unnecessary hyphen	0.22	0.39	1	0.12	0.38	0
Incorrect possessive	0.22	0.57	1	0.06	0.17	0
Missing comma(s) in a series	0.2	0.41	1	0.12	0.22	0
Faulty pronoun agreement	0.18	0.37	1	0.12	0.28	0
Incorrectly used semi-colon	0.2	0.64	1	0.06	0.24	0
Missing semi-colon	0.14	0.61	1	0.15	0.39	1
Misplaced or dangling modifiers	0.12	0.32	1	0.18	0.25	1
Then/than	0.13	0.59	1	0.03	0.12	0
Incorrect or missing colon	0.09	0.28	0	0.06	0.17	0
Others	0.05	0.19	0	0.15	0.42	1
You're/your	0.03	0.12	0	0	0	0
Its/it's	0.02	0.1	0	0	0	0
Unnecessary shift in person	0.01	0.07	0	0.03	0.12	0
Affect/effect	0.01	0.07	0	0	0	0
Affect/effect	0.01	0.07	0	0	0	0

writing and the value of writing instruction that is focused on reducing error. Our findings, even if unsurprising, shed light on an important aspect of adolescent student writing that has not been studied extensively but often receives a disproportionate amount of attention (Applebee & Langer, 2013)—especially in view of widespread complaints that students today lack "basic" writing skills needed for college or the workplace. At the same time, this study underscores longstanding questions about the problematic way that error in writing is understood and treated as a component of writing instruction—questions that have been raised by other researchers (Cook, 2010; Haswell, 1988; Williams, 1981).

First, our findings do not suggest that the frequency or nature of formal error in the writing of adolescents reflects a crisis in student writing ability, as often seems to be assumed in much of the public discourse about education reform and, specifically, literacy instruction. The error rates we found in our sample were greater than those found in studies of college writers (Cook, 2010; Lunsford & Lunsford, 2008). Students in our sample made errors at a rate of 5.34 per 100 words in their ELA essays and 7.14 per 100 words in social studies essays. By contrast, Lunsford and Lunsford (2008) found an error rate of 2.45 per 100 words in their sample of essays written by college students. However, these differences are not surprising given differences in the student populations whose writing was analyzed in these studies. Students in our sample were not selected on the basis of academic achievement and therefore included students who may or may not attend college, whereas the essays analyzed by Lunsford and Lunsford (2008) were written by students who were, by definition, academically successful enough to gain admission to college. Moreover, our sample included essays written in both social studies and ELA classes, whereas Lunsford and Lunsford (2008) collected only essays written for introductory college writing courses, which tend to be characterized by greater attention to the technical aspects of writing. If spelling, which we discuss below, were excluded from the analysis, the error rates we found would be even closer to those found by Lunsford and Lunsford (2008). Beyond the rates of error, the types of errors made by students in our sample do not suggest a widespread lack of understanding of the most important rules of standard written English. The most common errors we found did not include serious errors of syntax that can significantly impede meaning; rather, the most common errors were relatively minor errors of punctuation, mechanics, and usage.

In general, then, our findings do not seem to support the common notion that adolescent students lack basic skills in written English. In this regard, our findings seem consistent with the results of the National Assessment of Educational Progress (NCES 2011) writing tests, which indicate that approximately four out of five twelfth grade students in the U.S. write at a level described as "basic," which includes the ability to "use grammar, usage, and mechanics that are mostly correct but with a few distracting errors that may occasionally impede understanding" (National Assessment Governing Board, 2010, p. 78). Such findings cannot easily be explained by a widespread decline in students' "basic" skills; rather, these findings make sense if understood in terms of the developmental nature of writing ability and the contextual nature of writing development.

Our results include two statistically significant findings.

First, students in our sample made errors with greater frequency in their social studies essays than in their ELA essays. This difference is not surprising given that ELA classes are more likely than social studies classes to incorporate pedagogical strategies that focus explicitly on writing. In their National Study of Writing Instruction, Applebee and Langer (2011, p. 20) found that the English teachers in their national sample were much more likely than social studies teachers to report focusing instruction on specific aspects of the writing process. For example, 90.6 % of English teachers reported that they "spend class time generating and organizing ideas or information before writing" as compared to 60.7 % of social studies teachers; 90.1 % of English teachers as compared to 41.4 % of social studies teachers "teach specific strategies for planning, drafting, revising, and organizing written work"; and 43.9 % of English teacher as compared to 12.9 % of social studies teachers "organize a "workshop" environment in which students receive individual attention as they engage in learning the content, allowing for cycles of investigation, writing, and revision." Such pedagogical strategies are likely to result in more focused attention to the conventions of written English. Furthermore, 50.2 % of the English classes Applebee and Langer (2011, p. 22) observed included "writing-related instruction" of any kind, whereas only 17.1 % of social studies classes included such instruction; social studies classes very rarely included direct attention to "structure and organization," "grammar or usage," and "spelling." These pronounced differences suggest that students are less likely in social studies classes than in English classes to be asked to revise their essays or to receive attention to the kinds of errors related to the conventions of written English that we examined in the present study. As a result, it is reasonable to expect a higher rate of error in essays written in social studies classes. Moreover, given the findings of some studies suggesting that students' writing can be affected by the nature of the writing task and by the essay topic (Engelhard, Gordon, & Gabrielson, 1992; Greenberg, 1982; Hinkel, 2009), it is possible that writing tasks typically assigned in social studies classes might elicit a greater number of formal errors in student writing.

This finding suggests that care must be taken when drawing conclusions about errors in student writing. More specifically, the context of the writing—including the subject matter and the nature of the writing task—can significantly influence the nature and quality of the student writing. Accordingly, it can be risky to draw general conclusions about students' writing ability or their understanding of the conventions of written English without attention to the circumstances within which the students produced the writing.

Second, L2 students in our sample made errors at a greater rate than L1 students: 6.95 and 4.07 errors per 100 words, respectively. This finding is consistent with other research on L2 writing that has identified that indeed L2 writers as a whole tend to have greater numbers of the kinds of errors we investigated in this study (Ferris, 2004). Interestingly, there were no significant differences in the types of errors typically made by L1 and L2 writers. It is possible that differences in error types might emerge in a larger or more linguistically diverse sample. Moreover, we had no control over the identification of students as English Language Learners for

this study—something that was done by the schools participating in the National Study of Writing Instruction—so we do not know how much experience with written English these students had. It is possible that students identified as ELLs for this study were in fact bilingual or multilingual speakers who had relatively high proficiency in English.

For both the L1 and L2 students in our sample, spelling was the most common error. Small but statistically insignificant differences in error types between L1 and L2 writers occurred in the categories of verb tenses and singular/plural forms, which is consistent with the findings of other studies of L2 writers (Genesee, Lindholm-Leary, Saunders, & Christian, 2006). L2 writers may benefit from targeted instruction in these areas. However, it is important to note that research indicates that effective corrective feedback for L2 students should be guided by specific purposes, be appropriately timed, provided in the right amount and delivered effectively (Bitchener & Ferris, 2012).

As we note above, we found no statistically significant differences among the types of errors students made in their essays. The most common errors in all our analyses were relatively minor errors of punctuation, usage, and mechanics. Errors involving sentence structure, such as run-ons, fragments, and faulty syntax, which can significantly impede meaning and which can reflect a lack of understanding of fundamental concepts of written English, including sentence boundaries, were relatively few. Generally, these errors accounted for fewer than 4 % of total errors. Even if these more serious errors were combined, they represent a relatively small percentage of total errors. For example, run-ons, fragments, and faulty syntax accounted for 5 % of total errors in the ELA essays in our sample and 7 % of total errors in the social studies essays. Of course, some individual essays were replete with these more serious errors, which might suggest that that specific student did lack a sound understanding of the fundamental rules of syntax, but overall, the student writing in our sample was not characterized by such serious errors. We think this finding is important, for it calls into question prevailing views in popular discussions of education reform about students' lack of command of the "basics" of written English.

Spelling, as we have already indicated, might constitute a special case. It was the most common error in all our analyses, although our method did not allow for fine-grained analysis of the specific kinds of spelling errors students made. It is impossible to know, therefore, what percentage of the spelling errors in our sample might have been typos as compared to incorrectly spelled words. Moreover, spelling as a category of error encompasses a broad range of rules and exceptions to those rules. Other categories of error in our study, by contrast, were much more straightforward. For example, the conventions regarding the uses of commas after introductory elements are relatively simple. Given the complexity of spelling ability and the many different possible kinds of spelling errors, we can draw no conclusions about the nature of students' spelling ability on the basis of our analysis.

It is also impossible to determine the extent to which the use of word processing software might have affected the type and frequency of spelling errors. Many of the essays we analyzed had been hand-written by the students; many had been typed on a computer. So in some cases students are likely to have used the spell-check function of their word processing software. The impact of such software on

students' spelling is unclear. Lunsford and Lunsford (2008) found that the percentage of spelling errors in their sample of college writing (6.5 % of total errors) was noticeably lower than what Connors and Lunsford (1988) found in an earlier study, in which spelling errors outnumbered all other errors by three to one. Lunsford and Lunsford (2008, p. 796) speculate that "since almost every one of our 877 papers was word processed (a very few were handwritten on loose-leaf paper), we assume that the spell-check function took care of many potential spelling problems. Indeed, a great number of the spelling errors in our study are homonyms and proper nouns, mistakes that spell-checkers understandably do not flag."

Nevertheless, our findings point to a need for further investigation of spelling as a special category of error in student writing. The extent to which our findings reflect the developmental nature of spelling ability is unclear. It is possible that spelling error rates of 11 and 13 % of total errors, as we found in our sample of essays written by L1 and L2 writers, respectively, are typical among adolescent writers, but additional research is necessary to determine whether such rates should be cause for concern. In addition, the extent to which the spelling of students in our sample might have been shaped by students' use of computer software or other technologies for writing is a question that might be gaining currency as educators wonder about the impact of technology, and specifically social media, on students' writing skills. If nothing else, some research suggests that the presence of spelling errors can negatively influence a reader's perception of a writer's intellectual ability (Kreiner, Schnakenberg, Green, Costello, & McLin, 2002), which might be reason enough for researchers to look more closely at spelling errors in adolescent student writing.

Our findings make it difficult to generalize about the nature and frequency of error in adolescent writing, except to say that subject matter seems to affect error rates and that error rates differ for L1 and L2 writers. As we note above, very few kinds of errors were found to occur with great frequency in student writing in this study. Aside from a few types of errors (spelling, capitalization, and some punctuation errors), most errors described in textbooks appear relatively infrequently in school-sponsored writing. Moreover, in our sample of essays, the seven most common errors accounted for a little more than half of all errors (51 %). These findings suggest that educators could reduce overall error frequency by focusing attention on a relatively small number of common errors. Given that direct grammar instruction has been shown to have no correlation to writing quality (Graham & Perin, 2007, p. 21), these findings have important implications for writing instruction. For one thing, they suggest that an over-emphasis on error in writing instruction is very likely an inefficient pedagogical strategy, even if the goal is to eliminate error from student writing rather than to improve writing quality. Moreover, an obsession with error might undermine the broader effort to support students' development as competent writers. Haswell (1988) cautions against "unthinking or wholesale instructional tactics to squelch writing mistakes. Such tactics may only be squelching the growth in writing that precipitated the mistakes" (p. 495).

Finally, our experience in conducting this study highlighted for us some of the limitations of studying error. From the outset, we recognized that investigating the nature and frequency of formal error is laden with contradictions. Although we acknowledged the flaws of the construct of error, in order to investigate error, we

needed to define error in a relatively narrow, rigid, and conventional way and use consistent procedures to account for errors. While we did this to our best ability, we also found that our discussions with our coders about whether something was an error and what kind of error it was were more fascinating in some ways than the results of our analyses of types and frequencies of errors. These discussions revealed the often-divergent ways that qualified professionals with different backgrounds but similar goals as writing teachers perceived errors, which affected how they classified the errors they identified in our sample of student essays.

Conclusion

Our study suggests that Williams' calls to treat error "as a flawed verbal transaction between a writer and a reader" (Williams, 1981, p. 153) is both useful and incomplete. Many of the errors that the coders in our study easily recognized in our sample of essays did not impede meaning, even when the error was clearly identified as a mistake of some kind. In some cases, coders disagreed about how to code a specific error, even when they agreed that an error was present; in such cases, the specific nature of the error–that is, whether it was a misunderstanding of convention, a lack of knowledge about convention, or a deeper conceptual problem–was impossible to determine, so that the coder might conceivably place the error in one of several different categories. These complexities call into question the usefulness of conventional approaches to defining and evaluating error in mainstream writing instruction.

Our experience also raises questions about how researchers might measure the reliability of error coding procedures and instruments, whether they are human coders or e-rater technology. In short, our experience in designing and carrying out this study indicates the need for a more nuanced approach to error in student writing. We believe that error should not be understood as a reflection of a lack of competency if our collective goal is to incorporate efforts to address error into pedagogies that lead to the improvement in the writing of adolescent learners. Rather, we need a more sophisticated understanding of error in student writing so that we are better able to distinguish the developmental characteristics of error from factors such as technology use. In this regard, the lack of research about such a seemingly important aspect of student writing development constitutes a significant gap in our understanding of the development of writing competency among adolescent students and therefore represents an impediment to ongoing efforts to define effective writing pedagogies at a time of increasing emphasis on student writing ability.

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Appendix: Description of errors on coding instrument

1. **Missing Comma:**
   (a) Missing comma before coordinating conjunction (e.g. and, but, or):
   Plagiarism is unfair to people who put their hard work and effort into a piece of work and it should not be stolen by someone else. [comma missing after second *and*]
   (b) Missing comma after introductory element (such as a clause or phrase):
   When a student turns in a piece of work that they have not created they are stealing someone else's ideas and thoughts. [comma missing after *created*]
   Also I was starting school that fall. [comma missing after *Also*]
   (c) Missing comma before a quotation:
   Aldous Huxley once said "Experience is not what happens to a man. It is what a man does with what happens to him." [comma needed after *said*]
   (d) Missing comma around parenthetical elements or appositives:
   When me second brother was born, we switched rooms so that the boys could share the larger room and I the only girl could have the small room for myself. [commas needed after *I* and *girl*]
   What is interesting though is that they never realized what they were doing. [commas are needed before and after *though*]
   (e) Missing comma with non-restrictive element:
   My brother who wasn't wearing his seatbelt when he was pulled over received a ticket from the state trooper. [commas are needed after *brother* and *over*]
   (f) Missing comma(s) in a series:
   To complete the assignment you will need a pencil paper and an eraser. [a comma is needed after *pencil*; in academic writing, a comma is also needed after *paper*]
2. **Unnecessary Comma:**
   (a) Unnecessary comma separating sentence elements:
   The European nations are taking land from weaker nations, to increase their power. [comma is not needed after *nations*]
   Dr. Jekyll creates Hyde during an experiment, and discovers all the evil that festers within. [no comma needed after *experiment*]
   (b) Unnecessary comma with a restrictive element:
   The student, who receives the most votes, will win the election. [commas are not needed after *student* and *votes* because the relative clause "who receives the most votes" is a restrictive modifier]
3. **Incorrect Verb Form:**
   (a) Subject-verb agreement:
   The author use literary elements such as imagery to show an idea. [*use* should be *uses*]

The use of her commas are strategic in the sense that they set the rhythm and flow of her prose. [*are* should be *is* because the subject (*use*) is singular]

(b) Incorrect verb inflection:
Last week he refuse to hand in his assignment. [*refuse* should be *refused*]

4. **Wrong Word:**

(a) Wrong form of the word:
In the first passage the boy was attractive by the natural world. [*attractive* should be *attracted*]

(b) Incorrect or inappropriate word:
She spent an incontinent amount of time on Facebook. [*incontinent* should be *inordinate*]

(c) Affect/effect:
The rich nobles received the positive affects of the industrial revolution. [*affects* should be *effects*]

(d) Then/than:
Its influence grows and spreads farther then ever. [*then* should be *than*]

5. **You're/Your**
Your not the person I remember. [*Your* should be *You're*]
Make sure you have you're books with you. [*You're* should be *your*]
6. **Its/It's**
Its not a good idea to go alone. [*Its* should be *it's*]
The dog had a serious wound on it's hind leg. [*it's* should be *its*]
7. **Spelling Error**
8. **Comma Splice:**
My brother and I raced up the stairs to our rooms, these rooms had been assigned to us before we even saw the house. [comma before *these* must be either a semi-colon or a period, since a comma cannot separate two independent clauses]
9. **Run-on (or Fused) Sentence:**
At first I was resentful I wanted to my old life. [there must be a period or semi-colon after *resentful* to separate the two independent clauses]
10. **Faulty Sentence Structure**
With becoming a model, it means for teachers to be very specific about what they want their students to do. [the sentence structure makes this sentence unclear; it should read something like this: *When modeling for their students, teachers need to be very specific about what they expect their students to do.*]
11. **Fragment:**
Although, they were very interested in visiting that school.
12. **Missing Word:**
It's only when a worker stops and interacts with the product, admires and tests its utility that function and worth are born. [there should be an *and* after product; the comma is unnecessary]

13A. **Incorrect Semi-Colon:**
Incorrectly used semi-colon:
The mud becomes horrendous, and it gets everywhere; pants, short, hair. [semi-colon should be a colon]

14A. **Incorrect Semi-Colon:**
Missing semi-colon:
The internal resistance of the battery was found to be lower than it was in the other circuit, however, it still resulted in a significant difference in voltage. [comma before *however* should be a semi-colon]

15. **Incorrect Possessive:**
Depression can invade all aspects of ones life. [*ones* should be *one's*]
The teacher returned the student's papers. [If the sentence refers to more than one student, *student's* should be *students'*]

16. **Incorrect Singular or Plural:**
He owned four dog's. [*dog's* should be *dogs*]
She had three brother. [*brother* should be *brothers*]

17. **Unnecessary Word:**

18. **Capitalization Error:**

19. **Unnecessary or Missing Apostrophe (excluding possessives and its/it's):**
He couldnt see what was right in front of him. [*couldnt* should be *couldn't*]
She had her own cell phone but she really like their's. [*their's* should be *theirs*]

20. **Faulty Pronoun Agreement**
We put every tool back in their place. [*their* should be *its* because *tool* is singular]

21. **Vague Pronoun Reference**
Bob explained to Steve that he wasn't going anywhere. [the antecedent for *he* is unclear since *he* could refer either to Bob or Steve]

22. **Misplaced or Dangling Modifiers**
As a future writing teacher, each student will bring to me their mind with both a very unique way of thinking. [the prepositional phrase *as a future teacher of writing* modifies *me*, not *each student*, and is therefore misplaced in the sentence]

23. **Unnecessary Shift in Person**
Students should always edit their papers before submitting them, because careful editing will usually help you getter a better grade. [sentence shifts inappropriately from third person (students) to second person (you)]

24. **Article Error (the or a)**

25. **Missing or Unnecessary Hyphen**
They participated in a year long study of student error. [a hyphen is needed between *year* and *long*: *year-long*]
The twelve year old boy was still in the fifth grade. [*twelve year old* should be hyphenated: *twelve-year-old*]

26. **Incorrect or Missing Colon**
Every sailor should carry basic emergency equipment, for example: a flare gun, a whistle, and a compass. [The colon after *example* is incorrect; it should be replaced by a comma.]

27. **Incorrect or Missing Preposition**
    The boy swam on the water. [*on* should be *in* or *under* or *through*]
28. **Inappropriate or Missing Punctuation**
    Nick and Gatsby themselves symbolize this type of West Egg "person". [*period* should be *inside quotation marks*]
29. **Other**

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