

How quality of writing instruction impacts high-risk fourth graders' writing

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Abstract. From a larger longitudinal study of 610 fourth graders in 17 inner city schools, 40 students were randomly selected from 10 classrooms rated high (i.e., top quartile) or low (i.e., bottom quartile) in quality of writing instruction in grades 3 and 4. The written compositions of these students were scored in three ways: (1) according to a rating scale within a reliable scoring rubric, (2) according to countable surface features such as words correctly sequenced, and (3) according to the frequency of specific phonological, morphosyntactic, and orthographic errors in the children's writing. A multivariate analysis of variance was conducted to examine whether quality of writing instruction in grades 3 and 4 predicted students' writing performance at the end of grade 4. Students who received high quality instruction in fourth grade wrote longer compositions with more correctly spelled words than those who had poor quality writing instruction. There was a tendency for two years of quality instruction to be better than one, and, among students who had poor quality instruction in grade 3, compositions were longer in grade 4 when they received quality instruction in fourth grade. Foundational problems of language formulation, production and representation, however, were ubiquitous across the sample. Although these students were within the average range on standardized reading tests, spelling and writing were not developing at average levels. The study confirms the urgent need for more and better writing instruction for high risk, minority children.

Key words: Linguistic analysis, Reading, Spelling, Teacher quality, Writing, Writing instruction

Introduction

The epidemic of reading failure in schools that serve high-poverty and minority populations in the United States has stimulated major federal funding initiatives in the form of the Reading Excellence Act (1998) and the Reading First component of the No Child Left Behind Act (2001). These initiatives have supported the advancement of scientifically-based reading instruction and a strong emphasis on five critical components of effective reading instruction: phoneme awareness; phonics; vocabulary;

reading fluency; and reading comprehension. Written expression and spelling, however, have not been listed as components to be measured, monitored, or improved in nationally funded reading initiatives, although half of the items on the National Assessment of Educational Progress (NAEP) in reading require a constructed (i.e., written) response (Jenkins, Johnson, & Hileman, 2004; Mehta, Foorman, Branum-Martin, & Taylor, 2005), and the majority of students in 4th, 8th, and 12th grade demonstrated only partial mastery of the writing skill demanded at their grade level on the 1998 and 2002 NAEP (Greenwald, Persky, Campbell, & Mazzeo, 1999; Persky, Daane, & Jin, 2003).

The context of the writing study

This study of the writing skills of high-risk fourth graders was conducted within a large-scale, longitudinal study of reading development and reading instruction in Houston and the District of Columbia Public Schools. The approximately 1300 students in the 17 participating schools were 85–100% eligible for free and reduced lunch and 97% African-American. The primary aims of the large-scale study were to (a) demonstrate that reading failure could be prevented with early, effective classroom intervention that included explicit teaching of the alphabetic principle; (b) examine the effectiveness of tutorial interventions for children at-risk for failure; (c) document the relationship of initial reading skill and explicit instruction to spelling achievement; (d) evaluate the relationships between teacher knowledge, quality of instruction, allocation of instructional time, professional development, and initial student reading skill in predicting reading development; and (e) examine and report the factors that allow generalization of successful instructional interventions in grades K-4. Major findings of the reading studies included: the advantage of explicit over implicit instructional approaches in first and second grades (Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998); the positive impact of phonological awareness instruction in kindergarten on Grade 1 reading outcomes (Foorman et al., 2003); the importance of teacher content knowledge, teacher allocation of instructional time, and overall teacher quality on literacy development through grade 4 (Foorman & Moats, 2004); and the complex interaction of instructional factors in grades 1 and 2 in determining grade 2 classroom results (Foorman et al., in press).

As the roles of teachers, students, and classroom contexts were evaluated in predicting literacy outcomes, we realized the importance of

testing a measurement model of literacy that would avoid the shortcomings of univariate regression analyses of language, reading, spelling, and writing at the student level. We adopted instead a multilevel, multivariate, latent variable modeling approach to analyzing literacy outcomes. We investigated (a) the extent to which literacy was a unitary construct, (b) the differences between language competence and literacy levels, and (c) the relative roles of teachers and students in predicting literacy outcomes (Mehta et al., 2005). Utilizing data from 1342 students in 127 classrooms in grades 1–4 in these 17 high poverty schools, confirmatory factor models were fit with single- and two-factor structures at both student and classroom levels of analysis. Results supported a unitary literacy factor for reading and spelling, with the role of phonological awareness as an indicator of literacy declining across the grades. In this analysis, we discovered that writing performance on grade-level prompts was the least related to literacy (reading and spelling) but the most impacted by teacher effects. Writing contained substantial residual (unexplained) variance in all models, but teacher quality had a small, significant impact on written composition.

We also discovered that word reading, reading comprehension, and spelling were highly inter-related across grades 1–4, even though written composition was least related to other literacy outcomes. We had observed earlier (Foorman & Schatschneider, 2003) that teachers spent very little time on either writing instruction or meaningful spelling instruction, and that spelling achievement lagged significantly behind reading at all levels. By the end of fourth grade, with implementation of research-based instructional programs and practices in reading, students had achieved average standard scores on the Woodcock-Johnson *Psycho-Educational Battery-Revised* (1989) Passage Comprehension (97 and 98 in DC and Houston), and average scores on the Woodcock-Johnson's (1989) Basic Reading Cluster (103 and 101 in DC and Houston), but spelling scores on the *Kaufman Test of Educational Achievement* (Kaufman & Kaufman, 1985) were significantly lower (89 and 87 in DC and Houston, approximately the 24th and 20th percentiles).

Within the context of these findings, we decided to explore further the relationship between teacher quality, student writing performance, and the significance of the lower student spelling scores for understanding the kinds of writing challenges the children might be experiencing and whether instruction was a significant factor in student performance. We selected a sub-set of fourth-graders' compositions from classrooms representing high and low quality of writing instruction, and analyzed them from several perspectives. First, we used the scoring rubric of the Center for Academic and Reading Skills, based

on the Texas standards and available in the TPRI's *Intervention Activities Guide* (Texas Education Agency/University of Texas System, 2004–2006). These rubrics represent a traditional, reliable, holistic quality rating scale where trained raters score overall quality in terms of ideation, organization, grammar, sentence structure, appropriateness of word choice, and mechanics (Cooper, 1977). Second, we counted features such as number of words and number of words correctly sequenced. Third, we conducted a descriptive linguistic analysis of the phonological, orthographic, morphologic, and syntactic errors typical of the children's written compositions, and documented their limited use of cohesive devices.

Research questions concerned the interrelationships of several factors on high-poverty, at-risk children's writing skill development: (1) What effect does quality of writing instruction in grades 3 and 4 have on students' writing performance in grade 4? (2) What problems with foundational language skills are most prevalent in the compositions of this sample of fourth graders? (3) What are the implications of our findings for teaching at-risk elementary students in an accountability-focused educational context?

Comprehension and production of written language

To decode, comprehend, and produce written language, all young learners encounter disparities between spoken, conversational forms and the academic language forms they must learn to read and write (Halliday, 1985). However, those who speak a dialect that is close to the Standard English used in textbooks, literature, and formal communications should experience the fewest challenges in matching oral language with printed English and producing written English. Young children who speak a dialect that is removed from standard academic English should find the acquisition of academic language more problematic. With regard to reading, it is known that children with a strong grasp of English grammar and vocabulary are more likely to become better readers than students with poorly developed language prerequisites (Catts, Fey, Zhang, & Tomblin, 1999). Likewise, students' ability to manage the processes of written composition will be constrained by weak cognitive and linguistic foundational skills (Singer & Bashir, 2004).

Writing processes necessary for text construction include planning, organizing, text generation, and revision (Hayes, 2000). Skilled writers manage these processes simultaneously and recursively. Children with

language learning difficulties that are not necessarily dialect-related are known to struggle with conceptual organization of a text, resorting often to “knowledge telling” or writing whatever comes to mind (Bereiter & Scardamalia, 1987; Singer & Bashir, 2004). Their compositions tend to be shorter than those of good writers and to lack coherence and structure. Moreover, fluency in foundational skills, or lack thereof, constrains fluency and quality of written composition (Berninger, 2000; Berninger & Swanson, 1994). Graphomotor processes (handwriting accuracy and fluency) affect higher level writing functions through the primary grades (Berninger et al., 1997), as do linguistic skills including knowledge of syntax, morphology, spelling, and writing conventions. When children struggle with one or more foundational language skills, working memory available for planning, topic maintenance, word choice, deliberate use of cohesive devices, and other higher level composing skills will be limited.

Phonemic awareness and morphological awareness, among the foundational language skills, are important bedrock linguistic insights that support basic word processing strategies (see Blachman, 2000, for a review). For example, phonemic awareness and phonetic spelling (i.e., invented spelling) in first grade predict reading and spelling achievement at the end of grades 1 and 2 (Frost, 2001). Thus, if children lack the metalinguistic skills required for accurate spelling, they may be preoccupied with word level representation and unable to juggle other aspects of writing.

Recently it has also been demonstrated that young children who speak African American Vernacular English (AAVE) and who are less familiar with the forms of standard school English, as measured by a sentence repetition task, have more difficulty acquiring beginning reading skills (Charity, Scarborough, & Griffin, 2004) than classmates who can demonstrate greater familiarity with standard academic English. Dialect characteristics measured by the sentence repetition task included: consonant substitutions for /th/; omission or reduction of a consonant cluster; omission of a single consonant; omission or substitution of forms of the verb “to be”; omission of verb tense inflection; omission of reflexive pronoun or change of pronoun; substitution of *none* or *no* for *any*; and substitution of *a* for *an*. Phonological dialect features and grammatical dialect features were correlated with one another but comprised distinctive components of language processing, both of which were strongly correlated with both word recognition and passage comprehension in second graders. The relationship between dialect and writing was not explored in the Charity et al. study.

Method

Participants

Participants in this study consisted of 40 fourth grade students out of 610 fourth graders in 17 schools in Houston and in Washington, DC who completed writing samples in the larger study during the 2000–2001 school year. Thirty-eight of the 40 students were African-American, and 2 were Hispanic.

The 40 participating students were randomly selected from 10 classrooms rated high (i.e., top quartile) or low (i.e., bottom quartile) in quality of writing instruction in 61 grade 3 and 47 grade 4 according to a classroom observation system described below. Four random groups of students were selected: Those who had high quality writing instruction in third grade and high quality writing instruction in fourth grade (HH); high quality writing instruction in third grade and low quality writing instruction in fourth grade (HL); low quality writing instruction in third grade and high quality writing instruction in fourth grade (LH); or low quality writing instruction in both third and fourth grades (LL). Selection of students from these groups allowed us to analyze any cumulative effect of low or high quality writing instruction across two consecutive grade levels. Each group of 10 students comprised equal numbers of males and females with the exception of the HL group, which included 6 females and 4 males. The 40 participating students represented 95% of students available in these four groups and a number that guaranteed an equal number of students in each group.

The 10 teachers were representative of the 61 third and 47 fourth grade teachers teaching the classrooms from which these students were selected: Over 90% of the 108 teachers were African-American females. Mean years of teaching experience were 11.77 (SD = 11.80), with a range of 0–46 years. Over 90% of the teachers were fully certified, with the remaining 10% on provisional certificates pending completion of coursework and passage of exit exams.

Measures and procedures

Classroom observations

Ratings of teaching effectiveness and time allocation during the reading/language arts period were obtained in several ways. Trained observers visited classrooms in four observation waves distributed throughout the academic year, using reliable (i.e., inter-rater reliability > 0.80) ratings of overall teaching quality and the quality of instruction of each instructional

component, as well as time-sampling procedures for observing teaching behaviors, instructional group format, and student engagement (Foorman & Schatschneider, 2003). Quality ratings of teaching reading, writing, spelling, oral language, as well as an overall rating, were based on a scale of 1–6, and were completed by the observer at the end of the observation period. Quality ratings of writing instruction were higher for teachers who provided direct teaching of the skills and strategies needed for writing, who taught children to brainstorm and organize ideas before writing, who enabled children to improve first drafts, and who maintained clear standards for final products. Higher quality teachers also engaged students more consistently and conveyed a stronger sense of self-efficacy to the children, including a belief that self-expression was important, that strategies could be learned, and that their writing would be valued.

Writing samples

A structured personal narrative composition was obtained in May from all fourth grade students in the study. All classrooms were visited within a week by a graduate research assistant who administered the task, proctored the writing period, and collected the protocols. Students in all fourth grade classrooms were asked to write for 30 minutes in response to the prompt, “Tell about a time when you were frightened.” The title, “When I Was Frightened” was suggested but not required as a starter, and children were prepared to write with a 5–10 minute classroom verbal brainstorming session about the topic. Children were encouraged to use writing strategies they had been taught, such as mapping or outlining ideas before writing. They were also told that they were to use good words whenever possible, even if they were not sure how to spell them.

Absent students were located and tested by research assistants individually or in small groups within two weeks of the classroom testing date. Approximately 610 writing samples were obtained for students in this cohort.

Writing samples were scored using the Center for Academic and Reading Skills (CARS) scoring rubric, which had been developed and validated in prior years to evaluate the writing of second and third grade students. All compositions for fourth graders were scored by trained raters who achieved inter-rater reliability of 0.94 on 61 writing samples, or 10% of the total sample. Internal consistency for the CARS rubrics was 0.81 and was based on 8 items within the three domains of grammar and language use, ideas and organization, and mechanics: (1) addressing the prompt; (2) unity and logical organization; (3) vocabulary choice; (4) sentence completion; (5) grammar usage; (6) use of capitalization; (7) use of punctuation marks; and (8) spelling conventions. A 5-point (0 = poor,

1 = low average, 2 = average, 3 = high average, 4 = excellent) scale was used to score these items and maximum likelihood estimates of ability based on item response theory (IRT) were derived for analytic purposes. The CARS rubric and scoring criteria are included in the Appendix A.

In addition to the holistic scores derived from the CARS scoring rubric, compositions were also scored for the countable features of (1) total number of words; (2) total number of words correctly spelled; (3) total number of words correctly sequenced; and (4) total number of correctly constructed dependent or embedded clauses. Raw scores were used to analyze these countable features.

Finally, each writing sample was also reviewed by the first author to estimate the frequency and nature of specific linguistic confusions or non-standard usages in the children's spelling and written language. The analysis aimed to explain in more detail which phonological configurations, phoneme-grapheme correspondences, inflectional and derivational morphological structures, and Standard English grammatical structures were most challenging for the fourth graders. Analysis was undertaken by the first author and 10% of the samples were rescored by the second author with agreement above 0.90. Error types observed and justified in previous studies of students with normal and delayed spelling development were the basis for the categories (Cassar, Treiman, Moats, Polo, & Kessler, 2005; Moats, 1996). Because the majority of the students were speakers of African American Vernacular English (AAVE) as documented in one of our staff member's master's thesis (Seals, 2001), it was expected that some errors of spelling representation and non-standard usage would be dialect-related. However, we did not collect oral language samples from these 40 students and were not able to scale or quantify their use of AAVE; nor were we able to compare their oral use of AAVE with their written language.

The nature and frequency of the following selected error types were recorded for individuals and tallied across the 40 writing samples of students in the LL, HL, LH, and HH instructional groups. Handwriting was judged by a qualitative rating of 1 (poor) to 3 (clearly legible). Phonological errors were those that appeared to indicate faulty phoneme segmentation, identification, or production of the target word. Orthographic errors were those additional spelling errors that appeared to represent a wrong choice of grapheme (letter or letter combination). Those were categorized after phonological or morphological errors were accounted for. Morphological errors involved misrepresentation of meaningful word parts with stable spellings, such as word endings (inflections) and derivational suffixes. Error types, with examples, are listed below.

- A. Letter formation and legibility
 - 1 = below average, often illegible
 - 2 = mostly legible, with some prominent letter malformations
 - 3 = legible, with clear and accurate letter formation
- B. Phonological errors – general
 - 1. Consonant cluster reduction (AFAID/afraid)
 - 2. Weak syllable deletion (TENDO/Nintendo; SLEEP/asleep)
 - 3. Consonant voicing/devoicing (TROVE/drove)
 - 4. Omission, addition, assimilation, vocalization, or mis-sequencing of nasals [m], [n], [ŋ] and liquids [l], [r] placed after vowels (BOUNKANY/balcony); JUP/jump; BOLSTER/booster; DOCTA/doctor
 - 5. Other phoneme substitutions (ROUTH/roof; ATHER/after)
- C. Orthographic errors (Errors of letter choice that were neither phonological nor morphological errors.)
 - 1. Possible consonant grapheme (letter or letter combination) for single phoneme (SICCORS/scissors; PICHfork/pitchfork; GANETERS/janitors)
 - 2. Impossible consonant grapheme (WACTHING/watching)
 - 3. Possible vowel grapheme for single phoneme (WUS/was; TUCK/took)
 - 4. Impossible vowel graphemes (SIKE/seek)
 - 5. Failure to apply orthographic change rules for suffix addition (SPLATED/splatted; DRAGING/dragging)
 - 6. Whole word substitution, including homophones (IN/and; OF/off; THEIR/there; THAN/then; BRAKE/break)
- D. Morphological and Morpho-phonological errors
 - 1. Omission or phonetic spelling of past tense *-ed* (ASK/asked; FRIGHTEND/frightened)
 - 2. Omission or substitution of plural (HOUSE/houses; GHOST/ghosts) or possessive /s/
 - 3. Substitution of one inflection for another (FRIGHTEND/frightening)
 - 4. Omission, substitution, combination of derivational prefixes, roots, or suffixes (FRIGHTNESS/fright)
 - 5. Irregular past tense form incorrect (HIDED/hit; FORGETTED/forgot)
- E. Non-standard Grammar, Syntax and Usage
 - 1. Coordinating conjunctions and compound sentence construction (THAT/so that)

2. Subordinate and main clause construction (HE ASKED ME DID I WANT SOME CANDY; IT WAS ONE THING I SAW TOO WAS A BOX)
3. Non-standard verb form, including auxiliaries [outside of category D above] (IT BE A LOT OF PEOPLE; WE WAS ALL...; THEY HAVE OPERATE ME)
4. Non-standard negation (I DON'T TAKE NOTHING)
5. Preposition omitted/substituted (I RAN OUT MY ROOM)
6. Pronoun substitution (IT/them; THERE/they; HISSELF/himself)
7. Infinitives (HE STARTED TO CHASING ME)
8. Run-on sentences
9. Sentence fragments

Results

We conducted three kinds of analyses. First, we will present descriptive results from the time-sampling data in the third and fourth grade classrooms from which this sample was derived. Second, we will present results of multivariate analysis of variance (MANOVA) on the 40 fourth graders' writing performance as predicted by ratings of teaching quality in their classrooms. Third, we will present descriptive data on the analysis of linguistic errors in the 40 writing samples.

Description of time sampling data

First, we found that the amount of time devoted to writing instruction in our high-poverty schools was relatively minimal. Time-by-activity ratings for the third grade teachers indicated that one-third of the teachers never taught writing at all. As can be seen in Figure 1, the overall percentage of the reading/language arts block devoted to teaching writing was 8% in grade 3 and 11% in grade 4. Nevertheless, as we pointed out above, the amount of time allocated to writing instruction was positively and significantly related to writing outcomes in the third and fourth grade classrooms from which this sample was derived (Mehta et al., 2005).

Statistical analyses

Means and standard deviations for the writing variables are presented in Table 1. For the CARS rubric-derived ratings of the composite domains of grammar and language, ideas and organization, mechanics, and overall

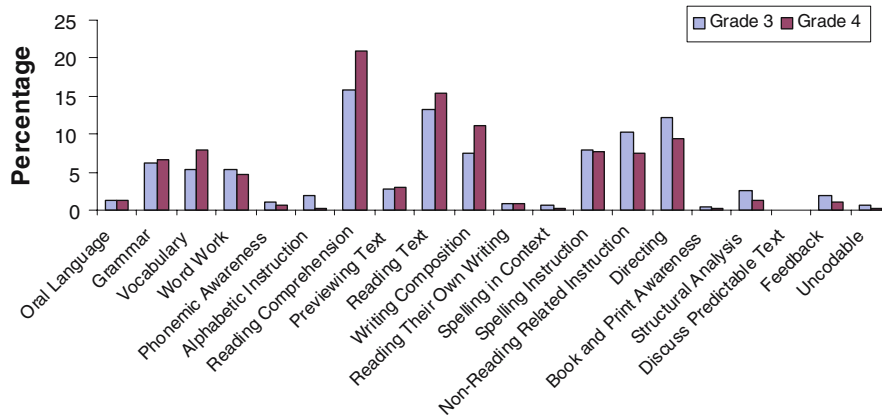


Figure 1. Percentage of observed time during reading/language periods allocated to various instructional activities in 107 third and fourth grade classrooms.

impression, both raw and IRT values are provided. Only raw scores are provided for the countable features. Raw scores for grammar and language and for mechanics range from 0 to 15, whereas they range from 0 to 10 for ideas and organization and from 0 to 5 for overall impression. One immediately notices that overall writing quality was low, regardless of the quality of instruction experienced by students in third and fourth grades, with fourth grade students earning a mean score between 1.2 (LH) and 1.9 (HH) on a scale of 0–4, with 2 designating “average”. One also notices that the scores for all writing variables tended to be in the expected direction, with higher scores associated with higher quality writing instruction, except for the grammar and language variable. In this case, average scores were highest and most variable with two years of low-rated instruction.

A MANOVA on the four rubric-related variables and four countable features was conducted with three *a priori* contrasts: (1) low priors (i.e., LL vs. LH: low quality writing instruction in both grades vs. low quality in grade 3 and high quality in grade 4); (2) high priors (HL vs. HH: high quality in grade 3 and low in grade 4 vs. high in both grades); (3) current high vs. current low quality (i.e., LH + HH vs. LL + HL: high quality writing instruction in grade 4 vs. low quality in grade 4). These three contrasts were selected, rather than the simpler LL to HH contrast, because the question of interest was whether higher quality instruction in grade 4 could mitigate the effect of low quality instruction in grade 3. Two out of three contrasts were significant. Specifically, the low priors contrast was significant, $F(8,29) = 4.66$, $P = 0.001$, $\eta^2 = 0.56$. In addition, the

Table 1. Table of means and standard deviations for writing variables by instructional group.

Variable	HH	HL	LH	LL
<i>Grammar and language</i>				
Sum of 3 items	5.00 (1.49)	5.10 (1.52)	3.90 (1.29)	5.30 (1.57)
IRT score	-0.08 (0.89)	-0.13 (0.78)	-0.81 (0.72)	-0.04 (0.78)
<i>Ideas and organization</i>				
Sum of 2 items	4.40 (1.26)	4.10 (1.10)	3.50 (0.71)	4.00 (1.05)
IRT score	0.21 (0.95)	0.03 (0.80)	-0.32 (0.46)	-0.10 (0.79)
<i>Mechanics</i>				
Sum of 3 items	4.30 (1.64)	3.70 (1.06)	3.40 (1.43)	3.80 (1.32)
IRT score	0.51 (1.20)	0.06 (0.78)	-0.15 (1.04)	0.15 (0.97)
Overall impression	1.90 (0.74)	1.60 (0.52)	1.20 (0.42)	1.70 (0.48)
Writing composite IRT score	0.11 (1.16)	0.01 (0.76)	-0.59 (0.77)	0.01 (0.98)
Total number of words	180.20 (62.54)	106.30 (80.29)	153.20 (72.08)	91.70 (44.87)
Total number of words correctly sequenced	104.90 (77.66)	53.50 (69.55)	58.90 (72.64)	58.00 (42.60)
Total number of words spelled correctly	173.10 (64.53)	102.50 (77.90)	139.70 (70.74)	89.20 (44.16)
Total number of clauses	2.90 (4.07)	1.30 (2.26)	2.00 (2.54)	0.90 (1.10)

Note. Values in parentheses represent standard deviations. HH = high quality writing instruction in both grades 3 and 4; HL = high quality writing instruction in grade 3 and low quality writing instruction in grade 4; LH = low quality writing instruction in grade 3 and high quality writing instruction in grade 4; LL = low quality writing instruction in both grades 3 and 4.

current high vs. current low contrast was significant, $F(8,29) = 4.22$, $P = 0.002$, $\eta^2 = 0.54$. However, the high priors contrast was not significant ($P > 0.05$). Based on these results, follow up ANOVAs were run with the same contrasts. Given that the high priors contrast was not significant at the MANOVA level, any interpretation of the same contrast in subsequent follow up analyses should be interpreted with extreme caution.

The ANOVA on total number of words in these fourth graders' compositions was significant, $F(3, 36) = 3.84$, $P = 0.018$, $R^2 = 0.24$. Both the low priors and high vs. low in grade 4 contrasts were significant: $F(1, 36) = 4.31$, $P = 0.045$, for low priors; and $F(1, 36) = 10.44$, $P = 0.003$ for high vs. low quality in grade 4. By looking at the means in Table 1 we see that results were in the expected direction. For low priors, the LH group ($M = 153.20$) scored higher than the LL group

($M = 91.70$). In other words, students who had low quality instruction in grade 3 wrote longer compositions in grade 4 if they had high rather than low quality instruction. Although the MANOVA contrast was not significant, the same pattern was apparent for high priors: the HH group ($M = 180.20$) scored higher than the HL group ($M = 106.30$). In other words, fourth grade students wrote longer compositions when they had high quality instruction in both grades 3 and 4, but not when quality instruction occurred only in grade 3. Finally, a similar pattern was apparent for current high vs. current low quality: the LH + HH groups [$(153.20 + 180.20)/2 = 166.70$] outperformed the LL + HL groups [$(91.70 + 106.30)/2 = 99$]. Fourth grade students wrote longer compositions in grade 4 when they had high quality instruction in grade 4 compared to low quality instruction in grade 4. In sum, results of all three planned comparisons indicate that students wrote significantly longer compositions in fourth grade if the quality of writing instruction received that year was rated as high. If they were fortunate enough to receive quality instruction two years in a row – in both grades 3 and 4 – there was a tendency for their compositions to be even longer.

The ANOVA on total number of words spelled correctly in these fourth graders' compositions was significant, $F(3, 36) = 3.35$, $P = 0.029$, $R^2 = 0.22$. The contrast of low priors was not significant ($P > 0.05$) but the other two contrasts were: $F(1, 36) = 5.80$, $P = 0.021$, for high priors; and $F(1, 36) = 8.53$, $P = 0.006$ for current high vs. low. Again, interpretation of the high priors contrast is suspect. By looking at the means in Table 1 we see that results are in the expected direction. The HH group spelled an average of 173.10 words correctly compared to the HL group's average of 102.50. The current high groups (LH + HH) spelled an average of 156.4 words correctly [i.e. $(139.7 + 173.1)/2$] and the current low quality groups (LL + HL) spelled an average of 95.85 words correctly [i.e. $(89.20 + 102.5)/2$]. Thus, fourth graders spelled significantly more words correctly in their compositions when they received quality writing instruction in grade 4. There was a tendency for this benefit to be magnified even more when quality writing instruction was available in both grades 3 and 4. One caution in interpreting these results, however, is that total number of words spelled correctly is constrained by the total number of words written. When we represent the spelling variable as a proportion of the total number of words in the compositions, we see very similar percentages: The HH group spelled 96% of words correctly (i.e., $173.1/180.2$), as did the HL group ($102.5/106.3$); the current high groups (LH + HH) spelled 94% of words correctly ($156.4/166.7$) and the current low (LL + HL) spelled 97% of words correctly ($95.85/99$). This suggests

that no matter what the quality of writing instruction is, students tend to select words for their compositions that they can spell.

While the overall ANOVA for grammar and language was not significant (i.e., $P > 0.05$), the contrast for low priors was significant, $F(1, 36) = 4.79$, $P = 0.035$. This result is not in the predicted direction, as we saw from the means in the top row of Table 1. The LH group had an average score of 3.90 ($SD = 1.29$) on the sum of the three items, whereas the LL group had an average score of 5.30 ($SD = 1.57$). This result suggests that among students receiving poor writing instruction in third grade, those receiving low quality writing instruction in fourth grade scored better in vocabulary choice, sentence completion, and grammar usage than students receiving high quality writing instruction in fourth grade. This anomalous finding appears due to the instability of the grammar usage aspect of the syntactic variable because means for total number of words correctly sequenced and total number of clauses – the countable syntactic features – were in the expected direction, and the scoring agreement for grammar usage was the lowest among the 8 items in the holistic scoring system.

Analysis of linguistic errors

Letter formation is an aspect of linguistic encoding, not a purely motor skill (Berninger, Cartwright, Yates, Swanson, & Abbott, 1994), and it is related to compositional quality and fluency; thus, it was included in the linguistic analysis. Seventeen of the 40 students had handwriting problems that affected legibility to a moderate or severe degree (ratings of 2 or 1). Only 48% of students used cursive letter formation, although cursive should be taught by 4th grade, and 42% of those students wrote illegibly (rated 1). Only 4 of the 21 children who used manuscript writing (19%), however, had significant problems with legibility. Legible cursive had not been mastered by a majority of the children.

All other error codings are summarized in Table 2. Phonological errors of spelling included those that clearly suggested inaccuracies in phonological coding, including phoneme segmentation, sequencing, or identification. Across the 40 compositions, 81 clear instances of phonological errors were distributed over 28 of the writing samples. Some consonant cluster deletions and weak syllable deletions occurred, but the most common specific phonological errors involved the representation of liquid and nasal consonants after vowels.

Although children in this sample spelled about 95% of the words they used correctly, the orthographic error classification indicated as well that most students made errors and a few students were extremely poor spellers. Vowel misspellings (67) accounted for more errors than

Table 2. Categories and frequencies of linguistic errors.

**Error type	Total # errors	% of samples with error(s)	# compositions with error	Mean # per student (range)
B. Phon. Errors	81	70%	28	2 (0–9)
B.1. cons cluster	10	20%	8	> 1 (0–2)
B.2. weak syllable	8	18%	7	> 1 (0–2)
B.3. cons. voicing	1	–	1	–
B.4. nasals, liquids	28	35%	14	> 1 (0–6)
B.5. other	34	30%	12	> 1 (0–9)
C. Orthographic	162	95%	38	4 (0–38)
C.1. possible c.	15	18%	7	> 1 (0–5)
C.2. impossible c.	6	15%	6	> 1 (0–1)
C.3. possible v.	28	35%	14	> 1 (0–4)
C.4. impossible v.	39	23%	9	1 (0–18)
C.5. suffix addition	13	23%	9	> 1 (0–3)
C.6. word sub.	61	60%	24	1.5 (0–10)
D. Morphological	133	85%	34	3.3
D.1. past tense –ed	77	65%	26	1.9 (0–14)
D.2. plural, possess.	18	30%	12	> 1 (0–4)
D.3. other inflection	24	20%	8	> 1 (0–8)
D.4. derivational	6	8%	3	> 1 (0–3)
D.5. irregular p.t.	8	15%	6	> 1 (0–2)
E. Syntax/usage	267	100%	40	6.68 (1–29)
E.1. compound S's	1	0.03%	1	–
E.2. clause constr.	32	53%	21	> 1 (0–4)
E.3. non-standard v.	46	55%	22	1 (0–5)
E.4. negation	4	8%	3	> 1 (0–2)
E.5. preposition	5	13%	5	> 1 (0–1)
E.6. pronoun	5	10%	4	> 1 (1–2)
E.7. infinitive	1	0.03%	1	–
E.8. run-ons	141	58%	23	3.5 (0–27)
E.9. fragments	36	28%	11	1 (0–14)

**Explanation of error categories:

B. Phonological errors – general: 1. Consonant cluster reduction, 2. Weak syllable deletion, 3. Consonant voicing/devoicing, 4. Omission, addition, assimilation, vocalization, or mis-sequencing of nasals [m], [n], [ŋ] and liquids [l], [r] placed after vowels, 5. Other phoneme substitutions. C. Orthographic errors (non-overlapping with phonological and morphological categories): 1. Possible consonant grapheme for phoneme, 2. Impossible consonant grapheme for single phoneme, 3. Possible vowel grapheme for phoneme, 4.

Table 2. Continued.

Impossible vowel graphemes, 5. Failure to apply orthographic change rules for suffix addition, 6. Whole word substitution, including homophones, D. Morphological and Morpho-phonological Errors: 1. Omission or phonetic spelling of past tense *-ed*, 2. Omission or substitution of plural or possessive, 3. Substitution of one inflection for another, 4. Omission, substitution, combination of derivational prefixes, roots, or suffixes, 5. Irregular past tense form incorrect, E. Non-standard Grammar, Syntax and Usage: 1. Coordinating conjunctions and compound sentence construction, 2. Subordinate clause formation, 3. Verb form, including auxiliaries, 4. Negation, 5. Preposition omitted/substituted, 6. Pronoun substitution, 7. Infinitive construction, 8. Run-on sentences, 9. Sentence fragments.

consonant misspellings (21). The most common type of orthographic error occurred when students wrote a wrong but real word instead of the correct word. Homophone errors (e.g., *their*, *there*) were common, as well as confusion of function words (*a/an*; *the/then/they*; *on/one/once*) and other high frequency words (e.g., *was*, *come*, *in*, *and*, *any*, *with*, *went*, *when*, *off*, *of*).

Over the 40 compositions, 133 errors occurred in the representation of morphemes. Inflectional morpheme confusions, deletions, and misspellings were found in 85% of the compositions, averaging about 3 per composition. Twenty-six children made more than three errors on inflectional morphemes including *-ed* and *-s*. The regular past tense was especially problematic (77 errors). All other morphological errors occurred on irregular past tense forms, plurals and possessives, comparative endings *-er* and *-est*, and the use of the tense marker *-ing*.

Errors of syntax and usage were found in 100% of the writing samples and totaled 267, or about 7 per composition on average. Ungrammatical clause construction was found in 53% of the compositions. Verb formation, especially the use of auxiliaries and appropriate tense, was problematic for 55%. Run-on sentences in which sentence boundaries were unmarked or strung together with additive conjunctions were prevalent in 58% of the compositions. Students' sentences included the following:

One time when I was frightened was when
 He ask me did I want some candy
 One time when I was frightened! When I was sleeping in my room.
 When I was frightened, it was because I was watching a scary mo-
 vie that I have not seen before, I jumped!
 It was one thing I saw too was a box.
 I askt Woody why are you laughing.
 When it is dark it be a lot of strange people
 We was all outside

The snake coulded started danger
My grandmother have asma
I saw something that I never seen before
There were important news
Monster said he going to kill me

Cohesion was evaluated, in addition to the rubric-based ratings of content and organization, by a search for two kinds of cohesive ties: (a) lexical ties, including reiterations and appropriate use of synonyms for the same referent within and across sentences, and (b) transitional ties, including conjunctions and words that mark a time or space relationship, event sequence, comparison, addition, contrast or contradiction, repetition, emphasis, and/or cause and effect. About 1/3 of the students (13) used the synonyms *scared* and/or *afraid* for *frightened*, at least once. Beyond those words, only two students employed any synonyms as lexical referents. Lexical cohesion was achieved in another 1/3 of the compositions by multiple repetitions of the same word (e.g., *monster*). Another 1/3 used no lexical reiterations of any kind. Where transitional ties were used, in 31 of the 40 compositions, they were limited to additive conjunctions *and*, *then*, *and then*, *and so*, time and sequence markers *once*, *after that*, *the next day*, *the first thing* and the conjunctions *but* and *because*. Complex and later-developing conjunctions, such as *although*, were absent from any student's writing. These findings are consistent with other analyses of the writing of high-poverty intermediate level students (Jacobs, 1997).

The tally of the types of problems prevalent in the students' compositions indicates why they received overall low ratings of compositional quality on the CARS rubric, and why their spelling achievement was below average on the Kaufman Test of Educational Achievement. Many aspects of language structure and use had not been mastered by the students in our sample, even though they had achieved reading scores in the average range.

Discussion

In summarizing the research on the typical writing behavior of students with language learning disabilities (LLD), Singer and Bashir (2004) described a wide variety of difficulties with both higher level and lower level writing skills that restrict writing fluency and coherence. Like students with language learning disabilities (LLD), our high-poverty students also appeared "overwhelmed by the multiple demands of ... writing and

appear to have difficulty allocating sufficient cognitive resources to meet various writing demands ...” (Singer & Bashir, p. 559). The 40 students in our study, however, were not designated as LLD; they were average students in classrooms of struggling urban schools serving high-poverty, minority populations, whose instruction had typically been of poor quality or nonexistent. In spite of the relative success the students had achieved in reading, through a longitudinal effort to scale-up reading interventions, these 4th grade students had not mastered the foundational language skills needed to support the cognitive management of planning, organization, text generation, and on-line revision in composition.

The large majority of students generated personal narratives or descriptions that lacked true narrative structure and that comprised an apparently unplanned, associative rendering of thoughts or events characteristic of very beginning writers (Bereiter & Scardamalia, 1987). Cohesive devices were scarce beyond basic time-ordering words and additive conjunctions. To deploy attention and working memory in the service of explicit planning, organization, text construction and self-regulation strategies during the writing process, students must automatize many component skills of written language production (Berninger, 2000; Berninger et al., 1994; Graham, 1997). These include handwriting fluency and legibility, and knowledge of spelling, word form, basic sentence structure, punctuation and other conventions of written expression. Rapid, automatic access to the form of letters, words, sentences, and paragraphs is necessary if the writer is to keep an organizational plan in mind, monitor what has been written and what needs to be said, and link the words referentially. Our students’ ability to generate language at the levels of verb form, clause construction, morphosyntactic word endings, punctuation and orthographic patterns was very problematic considering the students’ average reading scores, and most certainly undermined their ability to juggle the cognitive demands of composition.

Our students’ limited vocabularies, documented in the parent study as being significantly below average (7th %ile in the study population), undoubtedly contributed to their dependence on repetitive uses of the same words and to under-elaboration of thoughts and ideas. The topic was provocative (*When I Was Frightened*) and compositions contained multiple references to violence, vulnerability, monsters, and various environmental threats. In this case, topic knowledge and engagement in the task may have been higher than would have been the case with a more banal assignment. The students had something to say, but nevertheless struggled to write.

In spite of the below average writing skill exhibited by these students, we were able to measure the quality of the instruction they received in 3rd and

4th grade and its impact on their productivity. Overall, our observational data indicated that very little time was spent on instruction in these classrooms, and that 1/3 of the teachers did not even teach composition. Children's self-efficacy and ability to deploy productive writing strategies almost certainly were impacted by lack of instruction and practice. Beyond finding the evidence for insufficient instruction, however, we did document a more hopeful effect: writing can improve, even in children of low verbal skill, when higher quality instruction occurs as late as fourth grade.

We compared groups of 4th grade students whose 3rd and 4th grade teachers were in the top quartile of ratings across the four observation waves per year (i.e., high quality) vs. students whose teachers were in the bottom quartile of ratings (i.e., low quality). Three *a priori* contrasts were examined: (1) low priors (i.e., students who had low quality writing instruction in both grades vs. low quality in grade 3 and high quality in grade 4); (2) high priors (i.e., students who had high quality instruction in third grade and low quality in fourth vs. high quality in both grades); and (3) current high vs. current low (i.e., students who had high vs. low quality in grade 4).

A multivariate analysis of variance (MANOVA) on the four holistic writing scores and the four countable features indicated that the first and third contrasts were significant with moderate effect sizes ($\eta^2 = 0.56$ and 0.54 , respectively). Follow up ANOVAs revealed significant contrasts in two of the countable features – total number of words and total number of words spelled correctly – and one of the holistic scoring categories – grammar and language. In both the analyses of total number of words and total number of words spelled correctly the third contrast was significant, indicating that high quality writing instruction in grade 4 led to longer compositions and more words spelled correctly at the end of fourth grade than low quality writing instruction in grade 4. These two variables were highly related in that students tended to select words for their compositions that they knew how to spell. The low priors contrast was also significant in the analysis of total number of words, indicating that low quality writing instruction in grade 3 needed to be followed by high quality instruction in grade 4 if students' compositions were to be significantly longer. Although the high priors contrast was not significant in the MANOVA, this contrast was significant in the analyses of total number of words and total number of words spelled correctly and results were in the expected direction of two years of quality writing instruction being better than just one year. In sum, students who received quality instruction in fourth grade wrote longer compositions with more correctly spelled words than those who had poor quality writing instruction. There was a tendency for two years of quality instruction to be better than one,

and, among students who had poor quality instruction in grade 3, compositions were longer in grade 4 when they received quality instruction in fourth grade.

Finally, in the analysis of one of the writing variables scored according to a holistic rating scheme there was the puzzling finding that students who received low quality instruction in both grades had compositions rated higher in grammar and language than students whose poor third grade instruction was followed by high quality fourth grade instruction. This anomalous finding may reflect the somewhat lower inter-rater reliability on ratings of grammar usage. Effects of instructional quality were not significant in analyses of the other holistic variables of ideas and organization, mechanics, and overall impression. Thus, the positive effects of higher quality instruction were observed primarily in the area of compositional fluency. It is likely that higher quality instruction may have nurtured higher levels of self-efficacy in the students who wrote more, even though they, too, continued to struggle with foundational skills. This modest result is not surprising given the relatively little amount of time devoted to writing instruction in these classrooms – 8% in grade 3 and 11% in grade 4 – and the students' incoming weaknesses in vocabulary knowledge.

Students who wrote more (and who were likely to have better quality instruction) may well have adapted better attitudes and expectations of themselves as writers. In one classroom, for example, where the instruction was rated as higher quality, several students spontaneously generated a graphic organizer before writing a draft, even though only 1/2 hour was allotted for the structured writing task. The graphic organizers were not necessarily meaningful, but the children who tried to generate graphic organizers had apparently been instructed in the importance of writing with a plan and a goal.

Part of our analysis probed in detail the specific difficulties the children experienced with the representation of words at the phonological, orthographic, and morpho-syntactic levels. Mastery of these structures is fundamental to the ability to write conventional school English. In addition, those who have mastered the basics are more likely to handle the multiple demands of the writing process because transcription skills have been automatized.

At the most basic level, students' fluency of output depends on their mastery of graphomotor skills of letter formation, alphabet production, word knowledge, grammar and spelling. About 1/3 of the 4th grade students demonstrated very poor handwriting, which is known to interfere with compositional quality and fluency (Berninger et al., 1994).

Handwriting problems were most likely attributable to lack of instruction, as so little direct teaching of writing skills was observed in earlier grades.

Halliday (1985) described the transition necessary in writing development from the transcription of conversational language, characterized by linear strings of ideas and unclear sentence boundaries, to academic or literary language, characterized by a much higher degree of embeddedness: adverbial clauses, relative clauses, appositives, passive voice, logical connectors that signal propositional relationships, infinitives, and prepositional phrases. Most normally progressing children are well on their way through this transition by the end of grade 4 when reading fluency has been achieved. For example, between grades 3 and 5, most children make rapid gains in their ability to analyze, interpret, and produce morphologically complex words, which become more and more prevalent in written academic text (Anglin, 1993), and their spontaneous writing typically shows consolidation of inflected forms and beginning use of derived forms. The children in our sample, however, commonly demonstrated difficulties with the phonological, morphological, and grammatical representation of linguistic structures in their spontaneous writing that undoubtedly contributed to the “low average” overall ratings and the disparity between their average reading scores and their low compositional quality.

The ability to read standard academic English for comprehension does not appear to be sufficient to enable students with dialect differences and/or linguistic disparities to represent Standard English forms in writing by the fourth grade level. The awareness of and representation of speech sounds with graphemes, awareness and representation of morpho-syntactic structures in spelling, and awareness and use of standard word and sentence forms each depend on the development of specific linguistic awarenesses (Bryant, Nunes, & Bindman, 2000) as well as, perhaps, a non-specific level of metalinguistic awareness that supports such skills as intrinsic and automatic comparison of dialects (Charity et al., 2004). As a tool to develop linguistic awareness, many applied linguists recommend that teachers teach students to contrast formal and informal grammatical patterns as part of writing instruction (e.g., Wheeler & Sword, 2004).

It is not possible to know, given our data, whether the children who struggled with the written representation of speech sounds, inflectional morphemes, and grammatical forms would have exhibited tacit awareness of these structures, for example on a recognition task, but were limited in their explicit and conscious expression in writing simply from lack of direct teaching and practice. Likewise, it is not possible to know how many children were lacking even tacit awareness of the standard academic English structures they were to use in written expression. How best to teach high risk students in low-performing schools deserves the kind of

vigorous research effort that is now underway in reading. We cannot assume that teaching reading is enough to enable students with language differences and disadvantages to master the multiple skills of writing. How much, what kind, what intensity, and the timing of explicit teaching about phonology, graphomotor production, morphology, English grammar, and text structure that will be necessary to support gains at higher levels of composition (ideas, organization, coherence, voice) are urgent questions for educators to resolve. At the very least, a renewed campaign to promote explicit teaching of writing processes and the skills that support them would seem an overdue correction in federal and state reading initiatives.

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Appendix

Appendix A. Summary of CARS writing rubric criteria.

1. Ideas and Organization

a. Ideas and organization

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

b. Unity and logical organization

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

2. Grammar and Language Use

a. Vocabulary completion

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

b. Sentence completion

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

c. Grammar Usage (verb agreement, tense, plural form)

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

3. Mechanics

a. Use of capitalization (beginning of sentences, proper nouns, etc.)

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

b. Use of punctuation marks (periods, commas, question marks, exclamation points, quotation marks)

0 = Poor 1 = Low Average 2 = Average 3 = High Average 4 = Excellent

Appendix B. CARS writing rubric criteria.

	0 Poor	1 Low	2 Average	3 High	4 Excellent
a. Addressing the prompt	The writer does not follow the prompt.	The prompt is partially addressed and has little development of ideas.	The prompt is addressed. There is a trend toward rambling and the development of ideas, may not directly revolve around the topic.	There is a clear purpose for writing and there is a decent amount of text.	The prompt is fully addressed. The writer introduces the topic and gives well-developed support for the ideas.
b. Unity and Logical Organization	Sentences may not be connected in thought. Transitions are poor or non-existing. Very poor plan, confusing to reader, or sparse amount of text.	Sentences inconsistently connected in thought. Some very basic transitions in thought. Ideas may jump around which make it hard to follow. Text has beginning, middle, and end but amount of text is sparse.	Reader can follow the story sequence although there may be a little jumping around. Uses of either paragraphs or transitional words for change in ideas. May be slightly hard to follow in one part.	Writing shows a logical flow of ideas; good sequence and use of transitions, although may have one slight error in this area as long as there are good examples and enough text to determine good knowledge of unity and logical organization.	Writer shows full understanding of sequencing, transitions, and flow of ideas by using a substantial amount of text and no errors in organization.

Appendix B. Continued.

	0 Poor	1 Low	2 Average	3 High	4 Excellent
<i>2. Grammar and Language Use</i>					
<i>a. Vocabulary Selection</i>					
Limited vocabulary. Word choices may be simple and repetitive.	Limited vocabulary, but shows some variation in word choices. May have some decent word choices, but text is sparse.	Most of the vocabulary is appropriate but undistinguished. Has simple language with a few good word choices.	Vocabulary shows some elaboration of ideas and rich use of words.	Contains very rich use of words with substantial amount of text. Use of words shows elaboration and further describes ideas.	
<i>b. Sentence Completion</i>					
Contains mostly run-ons and fragments.	Some simple correct sentences, with some run-ons or fragments.	Contains simple sentences with little variety. May have a repetitive sentence pattern. It may have one or two run-ons, but mostly correct simple sentences. It may contain sparse text with no errors.	Some variety in sentences – some complex sentences with embedded clauses. May have a mild error in sentence structure if it shows this variety. Text is not sparse.	Good use of complex sentences with embedded clauses. Sentence structure helps further develop ideas. Has substantial amount of text that shows examples of a variety of sentence structures.	

<p>c. Grammar Usage (verb agreement, tense, plural)</p>	<p>Contains mostly incorrect usages.</p> <p>Some correct usages with a few major errors.</p>	<p>Is partially correct; some minor errors or one major error. Text may be sparse with only some minor errors.</p>	<p>Has very few minor errors with substantial amount of text.</p>	<p>No errors with substantial amount of text.</p>
<p>3. <i>Mechanics</i></p>				
<p>a. Uses of Capitalization (beginning of sentences, proper nouns, etc.)</p>	<p>Many incorrect usages.</p> <p>Partially correct; (e.g., capitalizes beginning of sentences and "I"); some minor errors. Contains proper nouns, but uses them incorrectly or inconsistently.</p>	<p>Mostly correct use of capitalization; uses most proper nouns correctly.</p>	<p>Good examples of different capitalized words with one minor error.</p>	<p>Good examples of various types of capitalized words with no errors.</p>

Appendix B. Continued.

0 Poor	1 Low	2 Average	3 High	4 Excellent
b. Uses of Punctuation Marks (periods, commas, question marks, exclamation points, quotation marks)				
Many incorrect uses of punctuation. Uses very few periods and commas.	Sparse text uses few periods or commas. Text may have good amount of punctuation, but has a few errors.	Correct use of periods and commas. Text may contain commas, question marks, exclamation points, and quotation marks event though not always used correctly.	Consistent, accurate use with good examples of periods and commas. Uses other types of punctuation to help develop ideas.	Perfect use of punctuation with good examples of various punctuation marks to help develop ideas.

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