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BOSTON UNIVERSITY
SCHOOL OF EDUCATION

Dissertation

MATTHEW EFFECTS AND THE READING-WRITING CONNECTION

by

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B.A., Oak Hill College 1991
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Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Education

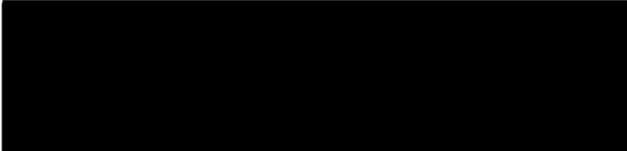
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To Emily, Ailsa and Thomas...who else!

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Ah, how cautiously a man should breathe
Near those who see not only what we do,
but have the sense which reads the mind beneath.

Dante, The Inferno - Canto XXI

MATTHEW EFFECTS AND THE READING-WRITING CONNECTION

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Boston University School of Education 2012

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ABSTRACT

This study examined the relationship between fifth-grade students' out-of-school reading habits and measures of their reading comprehension and writing abilities. The sample was composed of forty-two students attending an urban school in Northeastern Massachusetts. Each morning, for fifteen consecutive weeks, students recorded an approximation of the number of minutes they spent on designated out-of-school activities for the previous evening. The total amount of minutes they spent reading was recorded on an evening activity-log and the mean amount of nightly reading volume, per student, was calculated. Student reading comprehension ability was measured by percentile scores on two standardized reading assessments. Students produced written responses in a weekly journal, and these were analyzed by way of two qualitative writing rubrics. A Least Squares Regression model was adopted for the analysis of outcome variables. The regression mode ls explicitly sought to investigate Stanovich's Matthew effects theory (2000), where student reading volume operated as the predictor variable.

Results confirmed the study's research hypothesis. Student reading volume provided a correlation coefficient of $r=.37$ for reading comprehension and $r=.61$ for writing achievement. Moreover, all regression model results proved to be significant at a $p=.05$ level. Student reading volume proved to be a significant predictor for both reading and writing outcomes.

The findings of this study support the overarching argument of the Matthew effects theory. Students who read a great deal outperformed their peers on measures of both reading comprehension and writing ability. This is because the increased amount of print exposure they experienced resulted in an expansion of their cognitive and linguistic knowledge base. In turn, this increased knowledge base reciprocally affected literacy outcomes. The educational implications of the study are that classroom practices which encourage student reading habits, both inside and outside of the classroom, are critical for all aspects of student literacy development.

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Chapter 1: Introduction

Barely a day goes by during my observation of classrooms when I fail to detect stark differences in the range of student literacy abilities, accompanied by the recognition that this is partially due to differing patterns in their reading behavior. I have observed that those students who are successful in school tend to engage in lots of independent reading (Stanovich, 2000), while those who struggle academically do not (Allington, 2001). Moreover, this insight is as applicable to my experiences with third graders, as it was for the years when I taught high school.

I believe that this pattern in reading habits has enormous consequences for the students I have taught in Boston and Chelsea. While these struggling learners have an active imagination as well as intellectual curiosity, they lack the ability to engage in critical forms of abstract thinking and expressive language production that are crucial for success in school (Snow, Burns, & Griffin, 2005; Stahl, 1999; Stanovich, 2000).

Students need to develop the forms of academic discourse whose locus lies outside of their immediate socio-linguistic context (Delpit, 1996; Gee, 1999; Heath, 1983). Commenting on the importance of such language encounters within the classroom environment, Duke and Carlisle (2011) argue that a student's working knowledge of academic/literacy-styled language is "...critical in forming habits of mind that are necessary for the development of proficiency in

reading comprehension. Perhaps, not surprisingly, language and academic success go hand in hand” (p. 207).

For the past three decades literacy research has repeatedly affirmed the importance of the language exposure resulting from reading itself (Allington, 2001; Anderson, Wilson & Fielding, 1986; Nagy & Scott, 2004; National Reading Panel, 2000; Pressley, 2006). All of the seminal empirical studies that have examined the effect of student reading volume have found that it predicts subsequent reading outcomes (Anderson et al., 1988; Greaney, 1982; Guthrie, 2004; Walberg & Tsai, 1984). In his landmark research article on the Matthew effects, Stanovich (1986) asserted that students’ reading behavior plays a fundamental role in their cognitive/linguistic development and subsequent academic achievement: “...In short many things that facilitate further growth in reading comprehension ability – general knowledge, vocabulary, syntactic knowledge – are developed by reading itself” (p. 364).

A second aspect of the present study involves an understanding of the relationship between the reading and writing domains. The emphasis on the interconnectedness of these two literacy domains, and their importance for classroom instruction, is attested to in literacy research and theory (Jetton & Dole, 2004; Langer & Fihan, 2000; Nelson, 2008; Tierney & Shanahan, 1991). In addition, this relationship exhibits a developmental theme (i.e., this connection grows in its importance as students’ progress beyond the primary school years and move towards secondary school (Hillocks, 2008; Nagin, 2006).

From the late elementary school years onwards students need to increase the volume of their reading in order to both develop their reading comprehension (Duke & Carlisle, 2011). As they move beyond the early elementary school period students are increasingly required to represent their reading comprehension in the form of high quality written responses (Hillocks, 2008; Langer, 2001; Shanahan, 1984).

However the literature also presents the relationship between reading comprehension and written response as complex in nature (Langer & Fihan, 2000). For example, in their summary of data trends in the last two decades of NAEP reports the authors of the *Writing Next* report (Graham & Perin, 2007) conclude that while many students are able to handle average reading comprehension demands, they nevertheless exhibit “...severe difficulties with writing” (p. 7). Moreover, this finding is often overlooked in discussions of the ‘achievement gap’, which tend to rely solely on reading related measures and studies (Murphy & Blake, 2008; Nagin, 2006).

Just as the findings and implications drawn from reading volume research, particularly the Matthew effects theory (Stanovich, 1986), altered my professional judgment and teaching practices, so too my understanding of the reading-writing connection research has impacted what I see and do in classrooms. For example, last year I taught a Holocaust unit alongside two, novice, sixth-grade teachers. This unit began with our reading and discussing a variety of expository texts describing the experiences of European Jewry - from

the 1930s to the liberation of the camps in 1945. We then read and discussed Lois Lowry's *Number the Stars*, which is a fictional depiction of the Danish peoples' resistance to Nazism. This novel was studied in conjunction with selected poems written by the concentration camp survivor, Primo Levi. The unit culminated in a student writing assignment - in response to a field trip to the Holocaust Memorial, in downtown Boston.

Based on my previous experiences of teaching this unit I knew that while the majority of these students would be able to read the various texts and have insightful things to say during discussions about the material, when I asked them to express their responses in writing the result would reveal a disparity - for some a chasm - between their reading comprehension understanding and the quality of their written responses. This classroom experience aligns with the research conclusion of Graham and Perin (2007) - that the sophistication level of students' reading comprehension should not be considered as being synonymous with writing ability.

Rationale for the Present Study

The present study finds its origins in my attempt to synthesize reflections concerning student literacy behavior - as seen in classrooms - with the literacy research and theory I have read during my doctoral studies. This attempted synthesis came to focus on Stanovich's argument in the Matthew effects theory (2000). The argument is that a student's engagement in reading lies at the heart

of his/her school achievement, or as Allington colloquially expressed it, 'If they don't read much, how they ever gonna get good!' (1977, p. 1).

However, this attempted synthesis (i.e. to have theory inform practice) has unearthed a gap in the research literature. While reading volume research has examined student outcomes for cognitive reasoning, oral language production and reading comprehension ability (Cunningham & Stanovich, 2003), this has not been the case relating to student writing ability. To some extent this begs the question of whether the Matthew effects theory extends to the overarching gestalt of student literacy development. Do students who read extensively not only manifest high levels their reading comprehension, but do they also produce high quality writing? Can we extend the purview of the Matthew effects theory to an explanation for student writing development?

This study examined the reading and writing behaviors of a sample of urban fifth grade students. It utilized an ordinary least squares regression design to test the hypothesis that the student's nightly reading volume (independent variable) would predict both their reading comprehension achievement, and the quality of the writing found in their journals. The study responds to the following research questions:

1. What is the relationship between the volume of students' out-of-school reading and their reading comprehension ability?
2. What is the relationship between students' reading volume and the overall quality of their writing?

Chapter 2: Review of the Literature

The problem area of this study addresses the literacy domains of both student reading and writing behavior. Therefore, the following review of the research literature is divided into two major sections. The first section examines research that characterizes the relationship between student reading volume and literacy achievement. Two findings emerge from the seminal studies in this area. Firstly, those students who read extensively exhibit superior reading comprehension abilities, in comparison to peers who read very little (Anderson, Wilson, & Fielding, 1988; Stanovich, 2000; Walberg & Tsai, 1986). Secondly, these studies found that not only was there a broad range in student reading volume, but that the model which best describes the nature of the data distribution is non-linear in nature. Which is to say that the regression line is curvilinear not uniformly straight; rather, the tails of the distribution are markedly different from the pattern of distribution located at the mean (Greaney, 1980; Walberg & Tsai, 1986).

The second section examines the relationship between student reading and writing abilities. Findings of current research indicate that student literacy operates within a socio-cognitive and/or constructivist context (Anderson, Wilson & Fielding, 1988; Langer, 1986; Stanovich, 2000). In addition, several longitudinal studies found that the relationship between reading and writing abilities is developmental in nature. Thus, as students' progress through the school years, the nature of the reading-writing relationship changes (Hillocks,

986; Kellog, 1994; Langer, 2001). Lastly, while student reading-writing abilities are clearly interrelated, nevertheless, each domain operates as a distinct phenomenon (Langer & Fihan, 2000; Perin & Graham, 2007; Tierney & Pearson, 1991).

Reading Volume/Print Exposure

Research consistently indicates that the wide range found in student reading volume provides one of the key explanations for the disparities found in their literacy achievement (Adams, 1990; Anderson, 1982; Snow, Burns, & Griffin, 1999). Stanovich (1986) proposed a theoretical explanation of the impact of student reading volume on literacy development: he termed this theoretical framework the “Matthew effects” (p. 360). The framework of this argument suggests that a student’s ability to develop fluent and automatic word recognition skills is dependent on his/her (a) meta-linguistic ability, particularly phonological awareness, (b) alphabetic awareness, and (c) mastery of sound-symbol correspondence (i.e. phonics knowledge).

The development of automaticity in decoding text is critical for the student’s ability to engage in fluent, effortless reading. Fluent reading skills allow a student to direct cognitive and linguistic resources towards meaning construction (i.e., higher-level cognitive processing skills). In the case of the dysfluent reader, cognitive resources are instead directed towards phonics and

decoding tasks (i.e., lower level language processing, unrelated to the meaning of the text).

The theory also posits that fluent reading attainment leads to a critical emotional/affective response towards reading on the part of the student. Instead of a resource-draining focus on phonics and word attack, fluent reading allows for the opportunity of enjoyable and emotionally rewarding experiences with the meaning of the text. In turn, this positive reading experience often results in increased student reading volume, perpetuating the cycle of more enjoyment leading to more reading. Another critical aspect of the Matthew effects theory posits that increasing reading volume/print exposure sustains a student's access to rich vocabulary and world knowledge. This particular cognitive-linguistic exposure, rarely encountered in oral language, builds the foundations for further student cognitive-linguistic growth. Stanovich terms the link between print exposure to cognitive-linguistic outcomes as one of "reciprocal effects."

This theory also provides an explanation for a student's negative reading trajectory, one where failure to attain the requisite early skills leads to delayed acquisition of fluent and rewarding reading experiences. Without these experiences, the student fails to develop the same cognitive and linguistic achievements as peers who engage in a high volume of independent reading. This negative reciprocal model of reading development suggests that the persistence of the student achievement gap is accounted for, in part, by differential reading practices.

Finally, the Matthew effects model argues that the gap between the positive and negative reciprocal effects of reading volume only increases in importance as a student progresses through the school years; as each year passes the gap between the positive and negative Matthew effects grows. This longitudinal profile of student achievement Stanovich termed as the “Matthew Effects Model” (2000, p. 153), and this profile explains his adoption of the Biblical idiom of Matthew’s gospel: “...reading activity itself serves to increase the achievement differences between children. It is becoming increasingly evident that rich-get-richer and poor-get-poorer mechanisms are embedded in the social and cognitive contexts of schooling” (p. 666).

Student Reading Volume Studies: the Matthew effects

Much of the literacy research published during the last three decades indicates that literacy achievement disparities can partially account for the variance in student independent reading habits (Anderson, 1986; National Reading Panel Report, 2000; Snow, 2002). Educators have repeatedly advocated for classroom practices that foster increased student print exposure based on research findings (Allington, 2001; Chall, 2000; Duke & Carlisle, 2011).

For example, in the closing section of their report for the National Research Council, Snow, Burns, and Griffin (1999) argued that time, materials, and both teacher and school resources should be focused on supporting the development of student independent reading habits. Moreover, this argument

was seen as pertinent to increasing student reading volume in both in school setting and in the home. An examination of this body of influential research literature and the emergence of its primary themes follow in the subsequent sections.

Theme 1: A positive relationship exists between students' reading volume and their reading comprehension ability.

This first theme is drawn from the findings of seven quantitative research studies. All of them found a significant positive relationship between student reading volume and reading-related outcomes (Anderson, Wilson & Fielding, 1988; Cipielewski and Stanovich, 1992; Cunningham & Stanovich, 1991; Greaney, 1980; McBride-Chang, Manis, Seidenberg, Custodio & Doi, 1993; Taylor, Frye, & Maruyama, 1990; Walberg & Tsai, 1983)

In many reviews of reading volume research (Byrnes & Wasik, 2009; Snow et al., 1998; Stanovich, 2000) the first research study cited is that of Greaney (1980). This multiple-regression study examined the leisure time reading of Irish fifth grade students (n=290). Reading volume was hypothesized to be a significant predictor of subsequent student reading achievement, and was also compared to other leisure time activities and variables such as socio-economic status, family size, choice of television programs etc. The study employed reading comprehension measures from a battery of standardized reading assessments, and the students reading habits were measured by reading

behavior recorded in a self-reported diary. The study's primary finding indicated that the volume of students' leisure time reading was significantly correlated with their reading comprehension ability.

Walberg and Tsai's (1984) study of seventh graders' (n=2,912) performance on the NAEP assessment (1979) examined reading comprehension achievement in relationship to students' literacy behavior and attitudes. They examined both the students' reading comprehension scores on the various NAEP reading assessment tests and their survey responses regarding literacy behavior and attitudes. The research design employed a multiple-regression analysis of both the relationships between variables. Consistent with the findings of Greaney's study (1980) their data indicated a positive, albeit small, relationship ($r = .21$) between students' reading achievement scores and the amount of self-reported free reading they engaged in.

Anderson, et al.'s (1988) study of the relationship between reading habits and reading comprehension, a sample comprised of Midwestern fifth-graders (n=155), is the most influential reading volume research study encountered in the research literature: Stanovich (2000) went so far as to describe this study as 'canonical' for the reading research field (p. 293). Their study required students to record, in a daily activity diary, how many minutes they spent, per evening, on a wide range of outside of school activities. More specifically, they were asked to record an estimate of the approximate number of minutes they spent in independent nightly reading, over the course of 8 to 26 weeks. The students were

assessed on a battery of standardized reading assessments. By way of employing a multiple-regression analysis, which controlled for confounding variables, the study found a significant correlation in reading comprehension scores and in receptive vocabulary performance. Their findings led Anderson et al. to conclude that “reading books was the out of school activity that proved to have the strongest association with reading proficiency...time spent reading books was the best predictor of a child’s growth as a reader from the second to fifth grade” (p. 294). Moreover, commenting on the generalizability and educational significance of their study’s findings, they stated, “The case can be made that reading books is a cause, not merely a reflection, of reading proficiency” (p. 298).

Taylor, Frye, and Maruyama (1990) employed a multiple-regression research design in their study. This addressed the question of whether the range in student reading volume, separated from general reading ability, would explain the distribution in student reading comprehension ability. The sample (n=165) was comprised of suburban fifth and sixth graders. Reading behavior was measured by student self-reports in a daily activity diary of the minutes they spent reading, both inside and outside of school, while reading comprehension ability was measured by standardized scores on both the *Gates-MacGinitie Reading Test* and *S.R.A.* achievement tests. The findings indicated a significant correlational relationship between in school reading volume and reading comprehension ($r = .37$). In contrast, outside of school reading volume was not significantly correlated with reading comprehension ($r = .16$). While these results

are contradictory to Anderson et al.'s (1988) findings regarding the efficacy of student home reading volume, it should be noted that Taylor et al.'s research (1990) was the only study that measured both home and school reading volume. Moreover, the researchers themselves noted that their findings might have been influenced by the threat to statistical reliability posed by student recall. Their research design required students to estimate the previous night's reading, and they hypothesized that students probably had more difficulty remembering the amount of time they had spent reading at home the previous day than the time reading in school during the last 50-minute period of the day (Taylor et al. p. 360).

In a multiple regression study, Cunningham and Stanovich (1991) examined the predicative power of print exposure among fourth and fifth grade students (n=67), located in northeastern Canada. The study sought to examine the relationship between students' overall pattern of cognitive abilities and their reading related outcomes. Student reading volume/print exposure was measured by responses to a title recognition test that required students to correctly identify books they had read from a list of titles of popular children's literature. The students' reading ability and cognitive functioning was determined by a battery of assessment measures including nonverbal IQ, phonics, spelling, vocabulary, verbal fluency, picture vocabulary and general/world knowledge. The study's findings revealed a statistically significant relationship between student print exposure and all seven cognitive and academic variables. Furthermore, general

knowledge and receptive vocabulary knowledge accounted for a significant proportion of overall cognitive ability, and therefore provided a significant unique predictor for all five of the study's criterion variables. In addition, the findings also indicated that the students, who exhibited low phonics ability and/or low nonverbal IQ, nevertheless had strong vocabulary knowledge scores and concurrently reported high reading volume. Lastly, print exposure proved to be a significant predictor of spelling ability, verbal fluency, and general knowledge. Cunningham and Stanovich conclude that, taken together, these findings provide support for the Matthew effects. "These analyses suggest that print exposure...is probably a significant contributor to the development of other aspects of verbal intelligence. Such rich-get-richer (and their converse, poor-get-poorer) effects are becoming of increasing concern to educational practitioners" (p. 271).

In a follow up study, Cipielewski and Stanovich (1992) targeted the relationship between print exposure and students reading comprehension skills. The sample consisted of fourth and fifth grade students (n=98) recruited from a religiously-affiliated private school in northeastern Canada. For the purposes of their study, print exposure was again measured by the title recognition test (Cunningham & Stanovich, 1991) and by an additional author recognition test. The students' standardized scores on the *Iowa* and *Stanford Reading Achievement Test* represented reading comprehension ability. The study's findings indicated that a composite of the two print exposure measures were

significantly correlated with both the Iowa and Stanford assessments of reading comprehension. Moreover, print exposure accounted for a significant proportion of the variance in fifth-grade reading ability, while controlling for the influence of third-grade phonics ability. Cipielewski and Stanovich concluded that this empirical study of the Matthew effects theory not only supported the impact of reading volume on cognitive and linguistic efficacy, but also suggested that print exposure should "...play a more prominent role in future reading and cognitive development research" (p. 85).

In a cross-sectional research study of fifth and ninth graders (n=85) McBride-Chang, Manis, Seidenberg, Custodio, and Doi (1993) sought to largely replicate the research design of Cunningham and Stanovich (1991), but to additionally incorporate an analysis of disabled and non-disabled reader cohorts. Student reading volume was measured via the title recognition test, while reading comprehension was assessed by standard scores on a battery of academic assessments: the *Stanford Reading Comprehension test*, the *Stanford Reading Vocabulary Test*, and the *Woodcock-Johnson Word Identification test*. Multiple regression analysis was applied to the two separate groups of students (i.e. disabled and non-disabled). Students who scored below the 25th percentile for word attack skills were characterized as being reading-disabled. The study's findings indicated a significant variance between the two ability groups (i.e. that the correlation between reading comprehension and reading volume was differentially related to student reading ability). Readers with disabilities

demonstrated a strong correlation between reading volume and reading comprehension ($r=.64$), while typically developing readers failed to exhibit even a small Cohen's-d effect size ($r= .13$). When the influence of student word attack skills was controlled for, by way of hierarchical regression analyses, the findings indicated that reading volume accounted for an additional 17% of the variance in reading comprehension achievement. McBride-Chang et al. (1993) conclude that their study's findings support the reciprocal effects argument within the Matthew effects theory (p. 236).

Theme #2: Two patterns emerge from the descriptive statistics in reading volume research: that a broad range exists in student reading volume, and that the distributive pattern of student outcome scores is best described as being curvilinear in nature.

The first of these patterns identifies a similarity in the average amount of nightly reading carried out by students in the findings of the studies that are included in this review. It emerges that - regardless of a study's sample characteristics or its methodological design - the average amount of student nightly reading ranged between 14-19 minutes. The second pattern, which was discussed in many of the early reading volume studies, identified a curvilinear pattern of the data distribution. In this distribution, reading volume reached a critical level beyond which reading comprehension scores plateaued (i.e. no longer produced the same high correlative effect for reading outcomes).

When the relationship of students reading volume and their reading outcomes was examined, through the entire range of student data points, several studies detected a clear pattern of 'curvature' at the ends of the distribution (i.e. for these studies the 'regression line' for the coefficient was deemed to more closely approximate the model of a 'regression curve'). These two emergent patterns in the descriptive statistics of reading volume studies are now described.

In his study of Irish school children, Greaney (1982) found a moderate correlation existed ($r=.31$) between the amount of students' leisure time reading and their reading comprehension achievement. However, in his discussion of the descriptive statistics for the range of scores, he also noted the presence of a noticeable skew at the tails of the data distribution; with 22% of the sample not involved in any reading at all, while 12% of the sample spending more than three hours daily in home reading. Although the 50th percentile of home reading was estimated at 18.2 minutes, these skewed scores at the extreme ends of the distribution had a disproportionate effect on the subsequently produced correlation coefficient.

Walberg and Tsai's study (1984) also found a small correlative effect ($r=.18$) between students' reading volume and their reading comprehension. The average student was found to have engaged in approximately 15.2 minutes of nightly independent reading. However, an analysis of the relationship between a student's percentile cohort and the significance of his/her beta-value statistic indicted the presence of a non-uniform pattern in the distribution of reading

volume and reading outcomes. This finding led Walberg and Tsai (1984) to conclude that a linear model (a straight regression line) between reading volume and literacy outcomes offered a poor descriptive account of student outcome distribution. Moreover, they concluded that the educational implications of this findings were considerable "...the present achievement data show clear-cut diminishing returns...Continued probing in future investigations of the functional form of the relation of learning - to the factors that produce it - is likely to promote more efficient allocation of learning resources" (p. 450).

Anderson, Wilson, and Fielding (1988) found that the average 5th grade student in their sample read for approximately 12.9 minutes per evening. Consistent with the descriptive statistical discussion found in the previous two studies (Greaney, 1982; Walberg & Tsai, 1984), Anderson et al. found that both lower and upper quartile/percentile students exhibited very different data profiles. The high reading volume students (i.e. at and above the 90th percentile) spent nearly five times longer (i.e. 47 minutes) engaged in independent reading in comparison to the average (50th percentile) student, who read for approximately 12.9 minutes per evening. More starkly still, the 90th percentile student read two hundred times more than the low reading volume student (10th percentile), who read for a mere 1.6 minutes per evening. Anderson et al. (1988) saw considerable educational significance in their identification of this curvilinear model of student data: "...this suggests that time invested in reading yields big returns in reading proficiency at first, but that there are diminishing

returns as more and more additional time is invested” (p. 294).

Wigfield and Guthrie (1997) employed a multiple regression research design in their study of 4th and 5th grade students (n=105). Their sample comprised of students located in the Mid-Atlantic region of the United States. They examined the link between student’s motivational levels and the volume of their independent reading. Reading volume habits were measured by a parental estimation of the amount for home reading their child engaged in, which was recorded on an evening activity log, while students’ literacy attitudes and motivation were statistically measured by student responses on a Likert scale questionnaire.

Wigfield and Guthrie found that the average student in their sample spent approximately 14.7 minutes engaged in nightly reading. Consistent with the studies discussed above, the distributive pattern in student scores indicated a significant difference in the covariance of reading volume and outcomes located at the tails of their distribution. Moreover, this curvilinear model was predicated upon students’ motivational level: students who scored highest in intrinsic motivation read nearly three times as much text compared with the students located in the lowest quartile range for motivation. In their conclusion section Wigfield and Guthrie (1997) discussed the findings of Anderson et al.’s (1988) study with their own findings. They stated that this repeated presence of a curvilinear pattern in the data distribution entailed significant consequences for our understanding of the role of reading volume for student literacy

development. Taken together, these studies affirm that the central tendency measures (correlation coefficient) does not encompass all that can be known about reading volume and reading related outcomes.

Section #2: Reading-Writing Connection

The second area of literacy research, pertinent to this review of the literature, concerns the relationship of student reading and writing abilities. Three thematic findings emerge from this research. The first of which asserts that reading-writing behavior is best understood as operating within a socio-cognitive/socio-constructivist theoretical framework. The second finding asserts that while research studies have repeatedly confirmed the presence of a positive relationship between students reading and writing abilities, nevertheless, many of these studies add the qualification that the interpretation of this relationship is complex (e.g. a student's high level of reading comprehension does not automatically mean that he/she possesses commensurate level of writing ability). The third finding emerged from the findings of cross sectional and longitudinal research studies. These studies identified a pattern of developmental maturation in student reading and writing abilities: where older students generally outperformed younger students, and did so for multiple measures of reading and writing performance.

Before launching directly into a review of this body of research, a preliminary argument is required to explain the absence of a review of empirical

studies which directly address the relationship of student reading volume and writing achievement. Given that the Matthew effects argument (Stanovich, 2000) is the foundational theoretical orientation for this research study (e.g. the independent/predictor variable for the study's regression analysis are constructed to explore the Matthew effects argument), it would follow that the most pertinent research area to review would be prior studies of students' reading volume and their writing outcomes. Unfortunately this review did not identify any empirical study where reading volume and writing abilities were studied. This dearth in the research base therefore necessitates an examination of the closest body of research to the study's research questions. Therefore, the following section of the review of the literature will examine the findings of the more general research addressing the interrelationship of student reading-writing behavior.

Theoretical Framework

The first theme to emerge from a review of the research literature attests that almost all of the reading-writing researchers found in the seminal studies explicitly grounded their theoretical orientation within a socio-constructivist or socio-cognitive paradigm: although this construct can be understood in various ways (Briton, 1970; Dyson, 2000; Halliday, 1987; New London Group, 1996; O'Connor, 1998; Tierney & Pearson, 1996) .

However, this near universal acceptance of such a theoretical commitment is not without critique. Both of these critical terms (i.e. social-constructivism

and socio-cognitive) have been criticized in the research literature as representing a much too broad a range in terminological employment for providing strong evidence of construct validity. The heterogeneous nature of these research terms introduces an interpretive ambiguity which renders precision in discussing 'socio-constructivist' theory somewhat problematic: "For many people, the expression "social constructivist" seems to capture something important about social aspects of teaching and learning, although it is often not clear what that is (O'Connor, 1998, p. 25).

Nevertheless, all the studies reviewed in this section adopted some form of a socio-cognitive/constructivist theoretical framework. For sake of brevity, this framework will be characterized in the following description: a student's reading and writing behavior is grounded in the need to construct meaning, and this grounding is realized during all reading-writing tasks. An individual student's act of constructing meaning invariably takes place within the wider social-discourse, and its employment in his/her reading-writing tasks necessarily entail the conjoining of the student's individual cognitive processing abilities (e.g. long-term memory retrieval, meta-cognitive strategies), within the socio-cultural and socio-linguistic traditions of context and culture (Bashir & Singer, 2004; Hayes, 2000; Rosenblatt, 1994).

The research studies reviewed in this section are not unique in adopting a socio-constructivist theoretical orientation. The secondary literature in reading and writing research also predominantly represent student literacy behavior as

operating within such a framework (Herbert & Graham, 2011; Kamil, Afflerbach, Pearson, & Birr-Moje, 2011; Hayes, 2000; Nelson, 2008; Snow, Burns, & Griffin, 2005).

For example, in the preface to the fourth volume of the *Handbook of Reading Research*, the editors (Kamil, Pearson, Birr-Moje, & Afflerbach, 2011) characterize what they consider to be one of the most critical theoretical shifts in reading research: “...the field has witnessed an increased realization that cognitive variables interact with social and cultural variables in complex ways...” (p. xviii).

Likewise, the editor of the *Handbook of Research on Writing* (Bazermann, 2008) also indicated a paradigmatic shift in writing research and theory towards the socio-constructivist paradigm. Bazermann posited that up until the late 1970s writing research and theory were solely concerned with providing cognitive models of reading-writing behavior. However, the focus on cognitive profiles was radically altered by the emergence – in the mid-1980s - of the ‘social turn’ in educational research. The reading-writing research field was impacted by this radical paradigm shift, and it came to understand that the cognitive profile of the individual student inexorably operates within a social context. Moreover, many scholars voiced the contention that a theoretical synthesis – of cognitive and social attribution theory - needed to become an integral part of its explanations of student writing behavior: “...many researchers came to see cultural groups as

meaning makers, collectively constructing knowledge and understandings.”
(Bazermann, 2008, 438).

Individual empirical research studies also attest to this paradigmatic shift in writing theory. In his study of the reading and writing behavior of second and fifth graders (n=607), Shanahan (1984) explicitly posits the theoretical orientation of his study within a socio-constructivist account: “...according to the constructivist notions that currently predominate, readers construct or create messages through a variety of active processes” (p. 466). In his study Shanahan represented ‘constructivism’ solely in terms of the cognitive processing abilities of individual students. Less than a decade later, in a study comprising of third and fifth grade students (n=48), Cox, Shanahan and Tinzman (1991) added a social dimension to their theoretical understanding: “This experience based explanation seems more useful and more likely than the native abilities one since it suggests that social, cultural, and linguistic experiences influence language, reading, and writing development” (P. 205).

Langer’s (1986) study, of the reading and writing abilities of fifth-grade students, also explicitly acknowledged that the overarching theoretical framework of her study was socio-cognitive in nature: “Both cognitive and socio-cultural factors play a role in how and what one reads or writes and in the envisionment-building processes one goes through” (p.7). The argument, for understanding the efficacy of explicitly conjoining classroom content area reading with reflective writing instruction as operating within a socio-cognitive

context, was confirmed in Langer and Applebee's N.C.T.E. research report, *How Writing Shapes Thinking* (1987). Moreover, like Shanahan, Langer's commitment to this theoretical perspective has remained undiminished over the years. Sixteen years after her 1984 study, she conducted a large-scale study (25 schools, 44 exemplary teachers, located in 88 classrooms) in California, Texas, Florida, and New Jersey (Langer, 2002). In her introduction Langer explicitly outlines the theoretical orientation of the study:

We began the work holding a socio-cognitive view...from this perspective, it is posited that student performance in reading and writing is influenced by the instructional context the students experience, as well as on the larger educational environment. (p. 875).

Student data were comprised of both their performance on high stakes tests, and ordinal coding from student interviews and classroom observations. The study's multiple findings confirmed Langer's socio-constructivist perspective and led her to argue that this perspective offered the most robust and rich explanation of her study's findings.

In their review of writing research studies Applebee and Langer (1987) argued that, based on NAEP data, American students didn't engage in enough reading and writing, and that a review of the forms of reading and writing instruction that took place in classrooms explained this dearth. They argued for a paradigmatic shift of reading and writing instruction away from a product only focus towards a more process-oriented approach. At the close of their study they cite the theoretical foundation for this approach: "The view that we have adopted grows out of a more general view of language learning, one that has been heavily

influenced by the work of Vygotsky and Brunner...focusses on language as a social and communicative activity” (p. 139). The move towards a socio-cognitive approach to theory and research was clearly evident in the 1980s and has remained a critical insight ever since (Hillocks, 2006; Langer & Fihan, 2000; McArthur, Graham & Fitzgerald, 2006).

Student Reading-Writing Studies

This section of the review will outline the two major research findings, which are repeatedly found in seminal reading-writing studies. The first of these findings affirms the presence of a positive relationship between students reading and writing abilities (Nelson, 2009; Pearson & Tierney, 1984; Snow, Burns, & Griffin & 1998). However, this finding was repeatedly qualified with the rejoinder that the interrelationship of the reading and writing domains is complex in nature.

Shanahan’s study (1984) of second and fifth grade students (n=507) was explicitly designed to examine the interrelationship of their reading and writing abilities. It did so by way of employing a canonical regression analysis. This approach was chosen to explore how each particular domain influenced the other. The results of this study found that student reading and writing achievement were significantly related (e.g., their combined level of significance explained a full 43% of total shared variance). However, Shanahan qualified the interpretive significance of this statistical result. He pointed to the corollary -

that this statistic also infers that a full 57% of the variance was not explained by the interactive effect of reading and writing domains. Shanahan argues that this 57% of non-shared variance is particularly significant because of his study's explicit research design. The study was designed to maximize instrumental sensitivity to measures of the interrelationship of the reading-writing domains. Shanahan concluded that the findings supported an 'interactive model of reading and writing,' but qualified that this model must additionally account for the distinctive and autonomous operation of student reading and writing behavior (i.e. reading and writing domains are to be viewed as interrelated, yet distinct).

Langer's (2002) cross-sectional study - sample was comprised of students aged 8, 11 and 14 - firstly examined the correlational relationship between students reading comprehension and writing abilities (n=67). Secondly, it employed targeted reading-writing tasks to detect the presence of interactive effects between student age cohorts. The study employed a mixed research design, with the quantitative variables statistically examined by way of MANOVA, chi-square, and regression analysis. The main findings of the study supported an 'interactive model' of reading-writing abilities. In her 'general reflections' on the findings of the study Langer hypothesized that when reading and writing domains demonstrate clear similarities in student performance these should be viewed as stemming from a common language-base, which is operating during response to and composition of text. Conversely, when a differentiation between student reading and writing ability is present, then Langer hypothesized that this

distinctiveness stems from the differing purposes that reading and writing play in students' lives. For Langer, the classroom implications of this finding are nuanced. She argued that educators should firstly recognize the distinctive nature of both the reading and writing domains (i.e. to focus instruction on the differing functional uses of reading and writing tasks). But, teachers should also support the instructional practices associated with building the reading-writing connection. They can do so by incorporating student written responses to the texts they read. Langer concludes that, "Such an emphasis (of both approaches) can lead to communicative instruction" (p. 142).

Webster and Amon (1994) carried out a study which examined the interrelationship of students performance on Piagetian cognitive-stage development tasks vis-à-vis their reading and writing abilities. The sample was comprised of fifth grade students (n=65) living in the suburbs of greater Chicago. Multivariate statistical procedures (MANOVA) were employed to uncover the interactive effects of multiple variables. Student written transcripts were analyzed for the strength of syntactical complexity: This was measured using Hunt's t-unit statistic (1965). The findings of the study identified that the sentence complexity of a student's writing (average t-unit length) was significantly affected by his/her choice of a particular writing prompt. In terms of the qualitative nature of student cognitive reasoning tasks, the study found that the students made more frequent descriptive statements in their 'formal analytic writing' than in their 'personal analytic essays'. In addition, they made

more interpretive statements in 'extended' rather than in 'restricted' writing opportunities. Finally, in a post-test (three days after the writing assignment), students were asked to produce another written response to the material they had read. Again, the statistical findings were significant - with students scoring higher on writing rubrics when they engaged in extended rather than restricted writing tasks. Webster and Ammon concluded that, "At the interpretive level, there was again a strong contrast between restricted and extended writing, and no difference between personal analytic and formal analytic writing" (p. 29). Moreover, their findings implied that when the students are provided with an opportunity to write extensively about a story, they are likely to provide the details and inferences which are integral to a high cognitive interpretation of the text. This experimental design study clearly supported the research finding that the nature of the writing tasks, set by teachers, will impact the quality of students' interpretive reading of literary text.

The third and final research finding of this review attests that student reading-writing ability is linked to a student's chronological development. The previously reported study by Langer (1986) not only provided evidence of the complex interrelationship between reading and writing behavior, the study's findings also indicated that a student's grade-level placement (i.e. in her study - grades three, six and nine) significantly predicted the quality of his/her reading-writing outcomes. For example, in her analysis of a student's choice of meta-cognitive strategies during reading and writing tasks (e.g. dealing with the

differing genre characteristics of narrative and expository text) a students' knowledge of both local and globalized text-structure grew in terms of its complexity as he/she progressed through the school years. Transcript analysis found that older students began and ended their written compositions with more sophisticated written structures than younger students. An analysis of student writing samples also revealed that more complex syntactical structures were present in older students writing, and that these complex sentences supported more complex semantic representation of ideas. In essence, Langer found that a student's age was significantly predictive of the quality of his/her written composition.

Nelson, Spivey and King's study (1989) examined the ability of sixth, eighth and tenth graders (n=60) to create a cogent 'written discourse synthesis' in response to reading a topic from the vantage of multiple textual sources. Their study came to the same conclusion as Langer's (i.e. that a student's age was highly predictive of his/her reading and writing abilities). For example when a MANOVA was carried out, which compared students reading abilities with a measurement of the meta-cognitive strategies they employed during writing tasks, older students were found to have produced more textual content than younger students. In addition, they were also more likely to include the most important information from the various sources/readings in their writing. Nelson et al. concluded that "...another strong developmental finding was the grade level effect for increases in connectedness of discourse" (p. 20).

Cox, Shanahan and Tinzman's study (1991) analyzed the writing performance of third-and fifth-grade students (n=48) in producing 'functionally appropriate' expository text. The sample was also divided into two student cohorts - based on their reading ability. Student assignment, to either the 'good' or 'bad' reader cohort, was determined by performance on a standardized reading comprehension assessment. The findings of the study supported the hypothesis that a student's age affects his/her literacy outcomes, and this was found to be generalizable to both students reading and writing abilities:"...it appears that knowledge and control of basic content organization is as related to grade level as to reading level" (p. 200). Cox, Shanahan, and Tinzman's closing discussion of the significance of their findings explicitly linked this developmental/maturation finding to that of Langer's (1986).

These studies findings attest that a student's chronological development operates as a significant factor of explanation for student performances relating to the reading-writing connection.

Conclusions

Several important commonalities and differences emerge among the research findings reviewed above, which had important implications for both the methodological design and theoretical orientation of this study. These similarities and differences will be discussed in this final section of the review of the literature.

The first major thematic commonality found in both the reading volume and reading-writing research literature is that, beginning in the 1980s, their shared theoretical orientation espouses a socio-cognitive model of explanation. From the 1980s to the present, this theoretical paradigm has increasingly taken become the dominant understanding among a diverse group of literacy researchers (Adams, 1990; Bazermann, 2008; Bereiter & Scardamalia, 1987; Hayes, 2000; Hillocks, 1995; Kamil, Pearson, Birr-Moje, & Afflerbach, 2011; Kellogg, 1994).

Among the factors to be considered from this perspective are the students' culture and community. Stanovich (2000) explicitly links limited student literacy development with low income student populations; particularly students living in poverty. The theory also predicts that positive Matthew effects are more prevalently found among more affluent/middle class students. But, none of the reading volume studies reviewed included a sampling of students who were explicitly identified as coming from low SES backgrounds. So the Matthew effects model has not been empirically tested across SES populations. Therefore, the need is for reading volume studies that explicitly employ a cross sectional research design – where SES sampling characteristics are controlled for. Moreover, the efficacy of employing such an approach to methodological design has been widely recognized among reading researchers (Duke & Malette, 2004; Paris & Stahl 2005; Snow, 2002).

The second critique of reading volume research also pertains to the nature of the methodological characteristics of research design. All of the reading volume studies described in the review of the literature employed some form of regression analysis (e.g. hierarchical, canonical, factor-analysis regression etc.). But, none of these studies employed an experimental research design in their study. This is important because the literacy field's interpretation of reading volume research is necessarily constrained by the generalizability of non-experimental studies (Byrnes & Wasik, 2009; Snow, Burns & Griffin, 2005; Daphne & Anderson, 2011; Stanovich, 2000). The implications of this constraint for the validity and generalizability of correlational verses experimental research deign have been vigorously discussed and debated in the research literature (National Reading Panel, 2000; Shavelson & Towne, 2002; Pressley, Duke & Boiling, 2004). However, the field of literacy research has also recognized the validity of regression analysis studies as testing hypothesis beyond the merely associate nature of arguments produced by of zero-order correlational studies. An example of this strong argument in support of the explanatory power of regression studies is found in Stanovich and Cunningham (2004). They argue that a well-constructed regression analysis design study (i.e. one which controls for the strength of variance for each predictor variable) can resultantly move the discussion of findings ostensibly toward a quasi-causal explanation: "Experiments have strong resolving power and regression analysis have weak resolving power...(But) regression methods can be combined with theory in

ways that lead to some inferences that are stronger than those obtainable from the study of simple (i.e. zero-order) correlations” (p. 41-42).

Another key critique of the material reviewed in section one of the review of the literature (i.e. reading volume research), concerns the choice of particular instrument employed in research studies. In their discussions of the validity and overall generalizability of reading volume research, Byrnes and Wasik (2009) conclude that empirical findings robustly support the Matthew effects argument. However, Byrnes and Wasik go on point out that both the range and strength of the correlation coefficients indicated in the findings of reading volume studies seem to be linked to the choice of instrument for measuring student reading volume. They point out that studies which employed a survey instrument (e.g. Walberg & Tsai, 1984) tend to produce weaker correlational statistical results in comparison with studies that employed a student activity diary (e.g. Anderson, Wilson & Fielding, 1988). Byrnes and Wasik provide a hypothetical explanation for this pattern: “Imprecise measurement tends to lead to smaller correlations than precise measurement, so one would expect a journal approach to generate higher correlations than the questions approach. Studies generally confirm this expectation” (p. 243).

Given that the research design of this study (to be described in the next chapter) employs a student activity-diary, as its instrument for measuring student reading volume, Byrnes and Wasik’s critique should be factored into any discussion of the study’s findings.

The third thematic critique addresses the theoretical framing of the reading-writing studies found in the second section of the review of the literature. While there are many cognitive based theories and models that address the reading-writing processes of individual students (Bashir & Singer, 2004; Bereiter & Scardamalia, 1987; Graham & Perin, 2007, Hayes, 2000), there is no similar theoretical account of the development of student writing (i.e. one that would provide a developmental profile of the typical students writing abilities, as they progress beyond elementary into middle and high school). Moreover, the problematic nature of this paucity in the research is recognized by many writing researchers (Hillocks, 2006; Kellogg, 1994; Langer, 2000). For example, in their article addressing the developmental issues pertinent to understanding student reading and writing abilities, Fitzgerald and Shanahan (2000) provide the following critique of reading-writing studies: "...very little theoretical or empirical work has been done to examine the ways in which reading and writing are related across different developmental levels (p. 43). The lack of such a developmental-theory is pertinent for this study, because its absence will mean that the findings will not be interpretable within a widely accepted theoretical model of what typically progressing 5th grade students' produce in their writing

Finally, a major weakness outlined in this review of the literature concerns a paucity of research studies examining students reading volume behavior and writing ability. The theoretical contention belying this study is the Matthew effects argument - which argues that a student's volume of reading creates

reciprocal effects for student literacy abilities (i.e. student reading volume becomes the predictor variable for the regression analysis of both student reading and writing outcomes). The preceding review of the literature attests that while the Matthew effects argument is robustly supported by multiple studies relating to reading outcomes, there was no similar empirical study for student writing outcomes. This is important because while previous studies are there to help with the interpretation of reading volume and reading comprehension, no such body of reading volume studies are available to address writing outcomes.

Chapter 3 will outline the methodological design of this study is informed by this review of the literature.

Chapter 3: Methodology

The research design of this study is described below. This ordinary least squares regression design was employed to answer two research questions.

1. What is the relationship between the volume of students' out-of-school reading and their reading comprehension ability?
2. What is the relationship between students' reading volume and the overall quality of their writing?

The first of these questions closely replicates the provenance of a series of prior studies that explored the relationship between the amount of a students' reading volume and a measurement of their reading comprehension ability (Anderson, Wilson & Fielding, 1988; Cipielewski & Stanovich, 1992; Cunningham & Stanovich, 2004; Greaney, 1980; Walberg & Tsai, 1984). A case can be made for such replication, given that while the literacy community has acknowledged the importance of the reading volume argument for understanding student reading development, the number of empirical studies which have been conducted measuring this relationship are relatively small (Byrnes & Wasik, 2009; Stanovich, 2000). An additional argument - for the replication of the research design of previous research studies - can be made concerning how scientific discourse construes progress. The methodological approach, one where a theoretical hypothesis is strengthened after multiple studies come to the same robust finding, is what Harvard naturalist E. O. Wilson (1998) calls the '*consilience*' nature of scientific knowledge. In the field of literacy research,

Stanovich (2000; 2004; 2005) makes the same argument: “Science does not swing from idea to idea like a pendulum - it builds cumulatively” (Stanovich, 2005, p. 383).

The second research question addressed the relation of students’ reading volume rates to the quality of their writing. The review of the literature identified multiple studies where students’ reading comprehension and writing abilities were statistically analyzed (Hunt, 1965; Mellon, 1970; Langer, 1986), but it was not possible to identify an empirical research study where reading volume and writing variables were co-measured. Therefore, the study’s second research question can best be understood as constituting an extension of the provenance of the existing field of research; albeit the limitations of the research design (e.g. its small sample size) make generalizations to the general population impossible.

Site

The students who participated in this study all attended the same urban school, located in the Northeastern region of the United States. In September of 2009, the student population of the school consisted of 1,280 students. This population was evenly distributed between Kindergarten and 6th grade. Of this population, 76% percent were eligible to receive free lunch. This high percentage of low-income students qualified the school to apply for Federal Title 1 funding. The school’s profile meets the socio-economic criteria for a high poverty/inner-city school (Darling-Hammond & Bransford, 2005).

A further characteristic of the school sample is its racial/ethnic makeup. The following Table shows the demographic characteristics for the student population for 2009-2010.

Table 1. Demographic Profile of the School (September 2009)

African American	73%
Asian	2%
Caucasian	1%
Latino/Hispanic	20%
Multi-Racial	3%
Native American	1%

The demographic profile of the school, in terms of both race/ethnicity and SES characteristics, allowed the present study to address a limitation in the sampling-frame of much of the previous research on reading volume. This dearth of demographic differentiation in reading volume research studies was noted in Anderson, Wilson, and Fielding's landmark study (1988), and has remained problematic since (Byrnes & Wasik, 2005). In contrast, the subjects selected for the proposed study attended a school in an urban district, and included many students who were living in poverty.

The school was also chosen for the convenience of the sampling procedure: the researcher being a member of the school faculty. The attendant complications for the validity of the proposal's research design will be discussed in the limitations section at the close of this chapter.

Sample

The sample selection procedure for the study saw a random assignment of two, out of the available five, fifth grade classrooms

Both the sample classrooms were equally divided along gender lines and followed the same literacy curriculum during their English Language Arts block. The teachers in both classrooms (one male, and one female) had similar levels of professional experience and academic qualifications: both had attained a Master's Degree in Elementary Education, and had 5-8 years of urban classroom teaching experience.

Data Collection Procedures

The study took place during the time-span of a six month period. In order to investigate the study's research questions three different types of student data were collected: student evening activity logs, two sets of standardized assessment of reading comprehension ability, and student writing journals. A description of the specific aspects of these data sources is outlined in the next section, but the procedures for data collection are referenced in the table below.

Table 2. Data Collection Procedure

Data Type	Time of Data Collection	Assessment Statistic/ Measurement
I. Evening Activity Log	(February-May) 15 consecutive school weeks	Average Nightly Reading in minutes (Reading Volume)
II. Standardized Assessment Score for Reading Comprehension 1. G.R.A.D.E. 2. Stanford-9	(May) Administration of Assessment	Standardized Scores
III. Student Writing Journal	(January-June) Students address on-demand writing prompts (personal narrative) during their weekly writing block	Firstly, the quality of the student's writing ability will be assessed via two writing Rubrics 1. N.A.E.P. 2. N.W.P.

I. Evening Activity Log: was collected during the spring months of February to March. Important to note is that this reading volume data was collected during the same time frame as both the reading and writing data.

II. Reading Comprehension Assessments: both the *Group Reading Assessment Diagnostic Evaluation, (G.R.A.D.E.)* and the *Stanford Achievement Test (SAT-9)* were administered, to all fifth-grade students in the spring (May), as part of the school's literacy diagnostic battery of assessments. This administration was carried out in a formal assessment format. The student answer sheets were forwarded to the respective companies that produce the test, and the results were then sent back to the school. As the school's literacy-coach I was automatically sent the results for these tests. The nature

of the two assessments and the statistical outlay of the data findings are discussed in the next section.

III. Student Writing Journal: all of the school's fifth grade students took part in a weekly writing-block. During this time (approximately 45 minutes in length) they all responded, in a set apart writing journal, to teacher assigned writing prompts. A one-thousand word sample of the journal was used to measure for the quality of the students' writing.

Measures

The procedures for the study's data collection, and a description of each of the three main data source/instruments, are provided below. All the assessments and procedures for the research design were operationalized in previous peer-reviewed reading and writing research.

Measurement of Student Reading Volume

An evening activity-log was completed by the sample of students. These logs were filled out by the students each morning (see Appendix A for a field-tested example). Data was collected for the evenings of Sunday through Thursday, but not for the weekends or school vacations. The logs were collected for a total of fifteen consecutive school weeks (January to late May), and they provide an approximate average of each student's out of school reading volume.

The evening activity-log largely replicated the protocols used by Anderson, Wilson and Fielding's study (1988).

Of the four methods of measurement for outside of school reading volume (i.e. activity-log, student survey instruments, author and title identification assessment) the activity-log was chosen for this study. This was primarily due the high regard for this particular reading volume tool among literacy researchers. Addressing the use of this particular methodological design, Stanovich writes, "...Anderson et al. (1988) have established the reliability and validity of the activity diary method of estimating print exposure, their methodology might well be considered the canonical method for assessing print exposure" (200, p. 293).

However the format of the activity diary employed in this study also includes updated features. These were created by the researcher, in order to strengthen the internal validity of the methodological design of the reading volume measurement. The rationale for the design changes – in comparison to the design used by Anderson et al. - are presented below.

First, during a three week period of field testing this instrument, many students expressed their difficulty with accurately estimating the time they spent on different activities. This is hardly surprising given that these fifth graders are nine to ten years old. Therefore, to help students accurately approximate their evening activities a time-line feature was added to the evening activity log (See Appendix A). Subsequently, during further field-testing, students spent the first

three minutes of the activity log task placing the main events of their evening (e.g. when they got home from school; when they had meals and when they went to bed) on a timeline. Once this was timeline completed they used these markers to estimate the time spent on particular activities. Students indicated to the researcher that this feature of the log helped them to remember the events of their evening, and to accurately estimate the amount of time they spent on the designated activities.

A second refinement to the original Anderson, Wilson & Fielding activity log was the addition of several categories of activities that simply did not exist in the 1980s (e.g. cell phone and Internet usage). A strong argument could be made that the omission of such contemporary activity categories would pose a serious oversight for probing the activities of current youth culture.

Thirdly, in their original diary, Anderson, Wilson & Fielding (1988) did not ask students to discriminate between the amount of time they spent reading text assigned for homework, and the time spent reading voluntarily for pleasure. It could well be that students read more than they indicated in the Anderson study because they did not identify homework reading as part of their estimation. Therefore, the proposed log will involve a differentiation that will capture this qualification.

Taken as a whole, these three changes were pragmatically oriented toward strengthening the validity of the data collected.

Measurement of Reading Comprehension

The students' reading comprehension abilities were determined by their standardized scores on both the complete battery of the *Stanford Achievement Test* (SAT-9, 1996), and on the *Group Reading Assessment Diagnostic Evaluation* (Williams, 2001). An explanation for the use of more than one measure of reading comprehension follows. The SAT-9 yields an array of statistical results for its assessments. These include a statistic for total raw score, stanines, grade equivalency scores, standard-score scores (mean = 100, standard deviation= 15), normal curve equivalents, and growth scale values. In addition, The Sat-9 provides an aggregate or composite reading comprehension score. The SAT-9 manual provides a score for both of its subtests, and these subtests are described below:

1. Reading Vocabulary: cluster of tasks which probe student knowledge of synonyms, use of context to construct meaning, and identification of meanings for lexical items in sentences.
2. Reading Comprehension: a series of questions based on fictional, expository, and functional content. Included is an assessment of student initial understanding, interpretation, critical analysis, and process strategies.

The Stanford Achievement Test (SAT-9) is one of the most widely used standardized reading measures in education. One reason for its popularity with educational researchers is the close alignment of its testing format with that of the reading comprehension assessment of the *National Assessment of Educational Progress* (NAEP).

The SAT-9 reading comprehension test probes each student's level of prior knowledge of the theme/s of an unseen passage. This measurement thus provides an indication of the degree that a student's prior knowledge must be factored into the analysis of his/her reading comprehension of the passage. By analyzing multiple scores of reading comprehension (subtest and aggregate scores), the proposed research seeks to provide more comprehensive analysis of the range of students' reading comprehension abilities.

The SAT-9 employs a stratified random sampling methodology in order to accurately reflect the demographic characteristics of the overall U.S. school population. In the spring 2005 assessment, the norming sample was comprised of approximately 250,000 students from over 1,000 U.S. school districts. A response rate of twenty percent of invited schools/districts was obtained. Approximately 200,000 students participated in the fall 1995 norming - with a 30 percent response rate. A panel of 200 educators used the criterion-referenced criteria to score the SAT-9 battery.

In addition to its strong psychometric qualities, the SAT-9 has also been widely used by both reading and writing researchers (Chall, 2000; Snow et al, 2005; McArthur et al. 2006). Not only does the SAT-9 provide a warranted support for construct validity as a measurement of reading comprehension, but also the use of such a widely recognized reading assessment will strengthen the discussion of the possible educational significance of the study's findings.

The GRADE reading comprehension assessment (2001) also embodies

both a norm-referenced and criterion-referenced approach to assessing reading comprehension. The battery of its sub-tests measure four aspects of student reading comprehension ability; vocabulary knowledge, sentence comprehension, listening comprehension and passage comprehension. For the purposes of the two research questions found in this study, the composite score will be used for all regression analyses.

Measurement of Written Composition

The fifth grade students all participated in an hour-long writing block - as part of their daily English Language Arts instruction. During this writing block they were required to complete a journal response, which addressed a teacher generated writing prompt. These written responses were collected at the close of the study, and the journal responses constituted a sample of the quality of students' writing.

The overall quality of each student's writing was assessed by employing two qualitative writing rubrics: the N.A.E.P. writing assessment's *4th Grade Personal Narrative Scoring Guide* (see Appendix B), and the National Writing Panel's (N.W.P.) *6-traits 'analytic' rubric* (see Appendix C). The N.A.E.P. is a 'holistic' writing rubric which seeks to provide a large scale taxonomic assessment of student ability, while the N.W.P. 'analytic' rubric provides a more detailed analysis of six specific attributes of student writing.

Each of these rubrics offered a unique assessment of student writing

ability. Moreover, the inclusion of both a holistic and an analytic rubric allowed for a depth of interpretive analysis.

The predominant rationale for employing the *NAEP 'holistic' rubric for 4th Grade Narrative Rubric* (2007) was its strong claim to construct validity and methodological reliability. As a Congressionally mandated writing assessment, the NAEP undergoes constant reevaluation from the *National Academy of Education* (NAEP, 2002, p. 12), and is widely used as a benchmark for assessing multiple aspects of student literacy achievement, (Snow, Burns & Griffin 1999; Allington, 2001; Macarthur et al. 2006; Nagin, 2006; Addison-Stone et al. 2004).

Every five years, the NAEP publishes a report presenting the trends in student writing achievement (students the fourth, eighth and twelfth grades). The sample-frame includes subjects drawn from all 50 U.S. states. The schools selected for participation are assigned after a complex multistage sampling design, and the resulting demographic profile includes rural, urban and suburban population characteristics. Students selected for the NAEP assessment undergo a battery of multiple literacy achievement tests (NAEP, 2007). One of these subtests requires the creation of an *on-demand* written composition, one that employs a narrative writing prompt. This narrative prompt is described on the 2007 report as the following:

Narrative writing involves the production of stories or personal essays. Practice with these forms helps writers to develop an ear for language. Also, informative and persuasive writing can benefit from many of the strategies used in narrative writing. For example, there must be an effective ordering of events when relating an incident as part of a report. Sometimes narrative writing contributes to an awareness of the world as

the writer creates, manipulates, and interprets reality. Such writing—whether fact or fiction, poem, play, or personal essay—requires close observation of people, objects, and places. Further, this type of writing fosters creativity, imagination, and speculation by allowing the writer to express thoughts and then stand back, as a more detached observer might, and grasp more fully what is being felt and why. Thus, narrative writing offers a special opportunity to analyze and understand emotions and actions. (2007, p. 35)

This holistic rubric designates student performance on a continuum of six qualitative performance levels – that of *unsatisfactory, insufficient, uneven, sufficient, skillful and excellent*.

The NAEP rubric was selected for the study because its database provides a large sample of anchor papers. These papers were used for the scoring of the students' writing journals.

The second writing assessment employed in the study was the *6-traits Analytic Rubric* of the *National Writing Project* (Cullham, 2001). This rubric allowed for a cross-sectional analysis of particular aspects of student reading ability. This meant that a differentiation in the strength of correlation between specific writing traits and the percentile range of student reading volume habits could be discovered. This approach to data analysis was advantageous because it allowed for an examination of possible stronger writing traits.

An additional reason to include a second writing-rubric assessment is that, “because of its strong, natural link to revision, analytic assessment has become far and away the most preferred form of direct writing assessment at classroom, district and state levels” (Spandel, 2009, p. 21). Additionally, the analytic rubric has been employed in several recent writing research studies (Seale-Swaine,

Graves, & Morse, 2006; Seale-Swaine et al. 2007). Both of these factors described above may support the educational and research significance of the discussion of the study's results.

Data Analysis

Student data were primarily addressed by way of fitting a series of ordinary least squares (OLS) regression models. This design entailed different regression models, one in which students reading comprehension, (GRADE and SAT-9) serves as the dependent variable, and one in which students' written ability (NAEP, NWP Rubrics) serves as the dependent outcome variable. For both models, the independent predictor variable will be the students' reading volume scores (average minutes of nightly reading). Student gender was added as a second predictor (covariate) variable.

Process

The process for this statistical analysis employed several distinct stages. The first of which was to check that the both the reading comprehension abilities and the gender distribution of the students in the sample did not significantly differ from that of the larger population of fifth grade students. This was assessed by the means of the evaluation of descriptive statistics and independent sample t-tests.

The second step sought to ensure that three critical assumptions, for the

validity of an ordinary least squares regression model, were fully met. The first assumption establishes the presence of a *normal distribution* in the data dispersion for all variables (i.e. confirmation of homoscedasticity). The second critical assumption the *Normality of residual errors*, also addresses the pattern of the scatter of the data distribution of scores, and checks whether this distribution is closely clustered around the regression line. The third assumption explicitly seeks to identifying the presence of extremes scores (i.e. those scores deemed to be *outliers*). For a regression analysis this would mean those scores that operationally lie outside of three standard deviations above or below the mean. Outliers can be identified both by the means of running a scatter plot graph and by way of statistical testing for kurtosis and skewness. If any of these three critical assumptions had not been met, then subsequent statistical operations would have been necessitated. Moreover, the discussion of the study's findings would have had to identify that these assumptions were not met.

Once these preliminary data procedures have been established (i.e. confirming the robust quality of the sample's data distribution) the final steps will be devoted to the analysis of the proposal two research questions. This analysis involved the fitting a full taxonomy of ordinary least squares (OLS) regression model - to consider the relationship between students' nightly reading volume and their reading and writing abilities. The analysis began by fitting a conditional model with the reading and writing achievement scores as the outcome (dependent) variables. Then a second baseline control model was added

with the individual-level control variable of student gender. The objective was to determine whether students' reading volume significantly predicts students' reading and writing achievement scores, while controlling for the possible covariate of gender.

Limitations of the Study

The proposed study has five major limitations. These will be discussed in terms of their impact on both the reliability and the validity of the research design. The first limitation concerns the impossibility of making broad generalizations of the study's findings due to the small size of the sample (n=42). Such a small study cannot generate the statistical sampling *power* to allow for robust generalizations to the general population. Therefore, the subsequent analysis of the findings of the regression data will limit itself to an intra-sample analysis.

A second possible limitation to the research design of the study was the possible mitigating effect of the researcher's professional relationship to the teachers and students in the school-site. While a case could be made that the reliability of the proposed study was strengthened by the researcher's position as the school's literacy coach – it allowed a marked degree of access to the subjects during a lengthy and intensive period of data collection – this state of affairs may have also posed problems. For example, while the students were assured that the researcher wanted complete honesty in their reporting, and that he would never divulge their reading or homework profile to their classroom teachers, it

may be the case that students nevertheless inflated data estimates in order to please the researcher. More fundamentally, some students may not have been able to distinguish between the researcher's role as a data collector and his position as a member of the faculty.

A third limitation to the research design of the study concerned possible teacher effects. While the educational qualifications and professional experience of the two classroom teachers were broadly comparable, the quality of each classroom's literacy instruction was not been controlled for. This limitation is particularly important given the recognition in the literature of the significance of the teacher variable in student achievement (Adams, 1990, Chall, 2000; Langer, 2001; Snow, Burns & Griffin, 2005; Darling-Hammond and Bransford, 2005).

A fourth limitation to the research design concerns the reliability of students self-reporting their reading behavior. The students were asked to provide a daily estimation of their reading habits, and to consistently do so, for fifteen consecutive weeks. This approach replicates the diary method used by Anderson, Wilson & Fielding (1988), who themselves questioned the consistent motivation level of 5th grade students to accurately fill out a diary log, over an extended period of time. Therefore, the accuracy and reliability of student self-reports of reading volume is an internal threat to the validity of the research design; this limitation fits the category of a 'fatigue factor' outlined by Campbell & Stanley (1963). However, given that all the other methods for to measuring outside of school reading behavior rely on some form of student self-reporting,

the limitation is not isolated (Stanovich, 2000; Byrnes & Wasik, 2009).

A fifth limitation concerns the challenge of interpreting the findings in the absence of a theory of writing development. While the results of research on questions one and two can be analyzed in reference to Chall's stage theory of reading development (Chall, 1983; Indrisano & Chall, 1995) and Stanovich's Matthew effects model of differentiated student reading development, there is no comparable developmental theory of student writing development. The most recent and influential reviews of socio-cognitive theories and models of writing (McArthur, Graham & Fitzgerald, 2006; Smarginosky, 2006; Bazerman, 2008; Byrnes & Wasik, 200), do not provide a comprehensive description of how writing ability develops from the primary grades (1st through 3rd) to the later elementary school years (4th to 5th grade). What is missing from the literature is a theory to predict how students who enter 5th grade, with a particular reading profile, will manifest particular writing abilities. As Bereiter and Scardamalia (1987) recognized, the accumulation of research findings is not the ultimate goal of research; rather, such findings must be reintegrated into an overall understanding of how students construct meaning in literacy behavior (i.e. ultimately findings are interpreted in the light of theoretical understanding). The lack of a developmental theory, one that explains how reading-writing behaviors are realized for 5th graders, will limit the interpretation of the findings.

Chapter 4: Results

The chapter is divided into two major sections. The first of which addresses the generalizability of two variable relationships between the students found in the sample (n=42) and those in the other fifth grade classrooms (n=70). The key question is whether the sample's demographic makeup and its reading comprehension profile is representative of the fifth grade population as a whole?

The second section will provide an analysis of the regression results for the study's two research questions. We will look at the results for the relationship between student reading volume and reading comprehension ability: the purview of research question one. Then, we will look at the results for the relationship between students' nightly reading volume and the quality of their writing, the purview of research question two.

Section One: The Sample's Representativeness

Population Parameter: Student Gender

The preliminary section examines whether the students located in the sample represent a similar gender profile as that of the remaining fifth grade student population. Table three represents the gender distribution characteristics for all five classrooms in the school.

Table 3. Gender Distribution for the Entire 5th Grade Population

		Frequency	Percent	Cumulative Percent
Valid	Male	51	45.1	45.1
	Female	61	54.9	100.0
Total		112	100.0	

Although the results indicate a ten student disparity between male and female students in the overall fifth grade population (n=113); nonetheless, this suggests an approximate gender parity in the overall school population. Graphically this demographic distribution is represented by figure one.

Figure 1. Student Gender for fifth Grade Population (n=113)

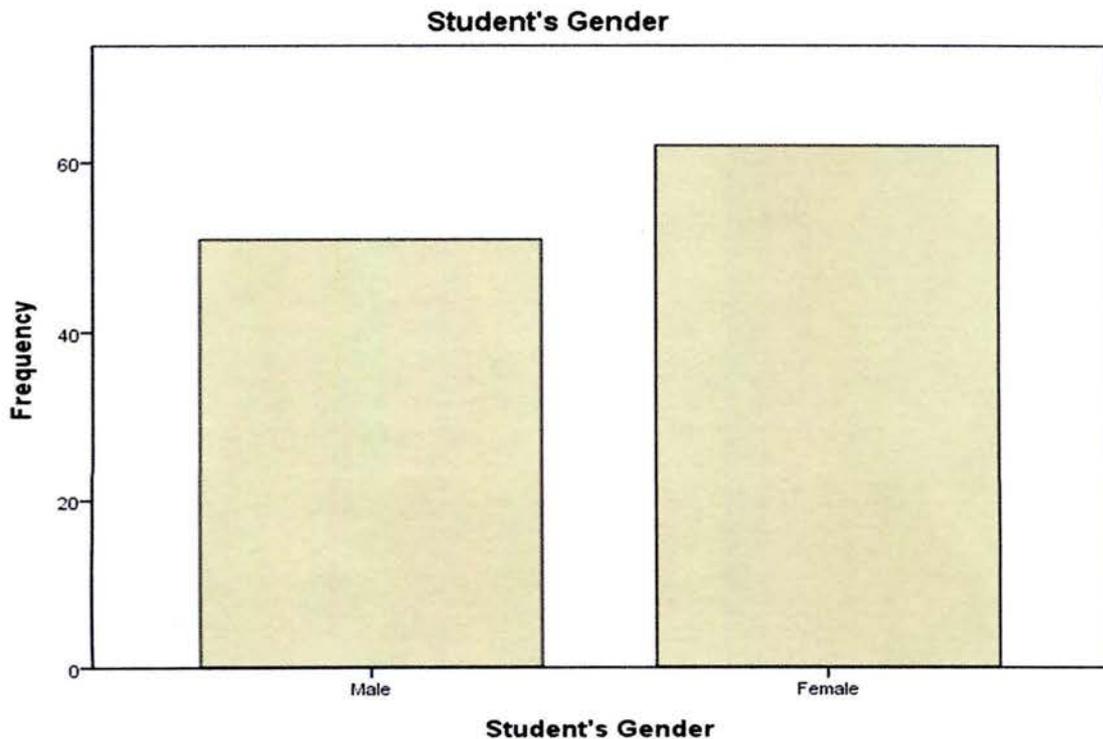


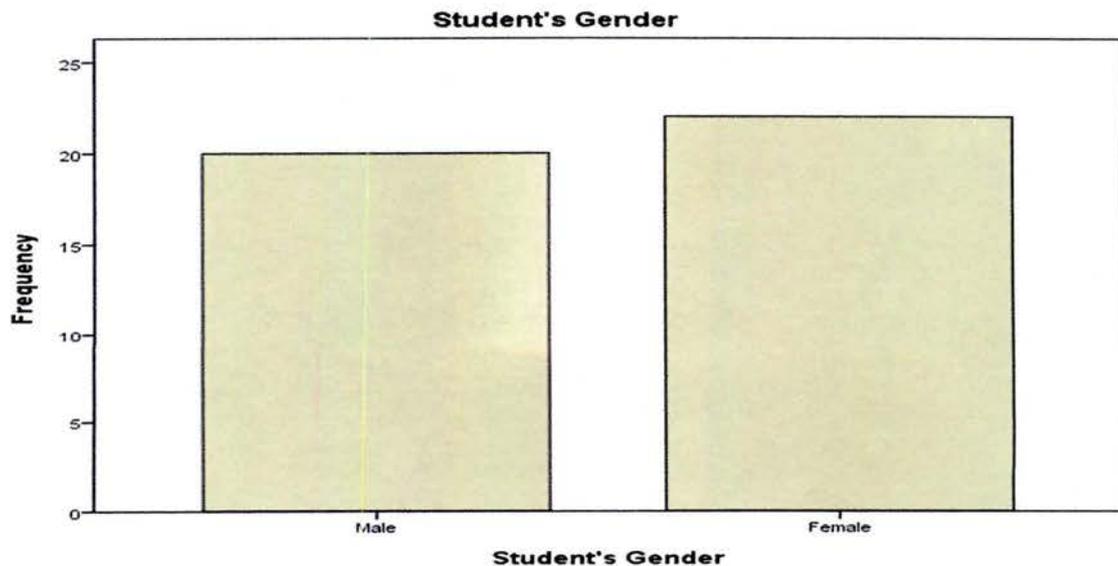
Table four provides descriptive statistics for the gender distribution of the sample population (n=42).

Table 4. Student Gender for the Sample (n=42)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	20	47.6	47.6	47.6
Female	22	52.4	52.4	100.0
Total	42	100.0	100.0	

As was the case for the population profile of the entire fifth grade, the raw count of the number of students in the sample (i.e. 20 males and 22 females) suggests a close parity for gender. The gender distribution of the students found in the sample is graphically represented by the following histogram (figure 2).

Figure 2. Gender Distribution for the Sample (n=42)



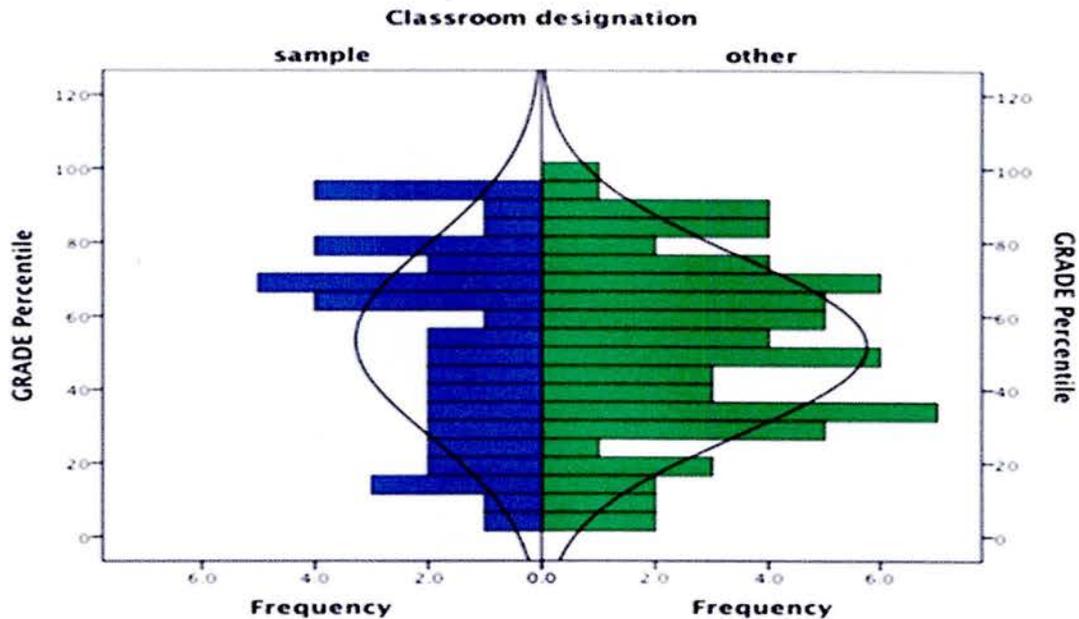
Population Parameter: Reading Comprehension

The second preliminary question asks whether there is a proximal similarity in the reading comprehension profiles of the sample (n=42) and the remaining 5th grade population (n=70). Specifically, do the students in the sample represent a similar range and profile in their reading comprehension ability (as measured on the GRADE Reading Assessment) as the overall fifth grade population?

Addressing this relationship is of crucial importance because of the desirability of being able to generalize the findings of the sample population to the other students in the fifth grade. Moreover, if the students assigned to the sample represent a significantly higher or lower achievement level in their reading comprehension, then the representativeness of their literacy profile for the fifth grade will be called into question: this would constitute a significant threat to the internal validity of the study's research design.

First, we will look at the respective distribution of student reading comprehension scores on the *GRADE Reading Achievement Test*. This is represented by the two student cohorts in figure three: a normal distribution curve has been superimposed for both cohorts (the designation 'population' represents the students of the remaining fifth grade classrooms n=70).

Figure 3. Reading Comprehension Scores by Two Student Populations



The graph visually confirms that (with respect to reading comprehension scores on the GRADE) both student populations broadly conform to the shape of a normal distribution.

Descriptive statistics for this question are provided in table six.

They indicate parity between the two populations: there are no significant statistical differences for the reading comprehension abilities of the two groups.

The students comprising the sample population had a mean reading comprehension score of 53.51 (where $SD=26.11$), while the students in the remaining three classrooms scored a mean of 51.94 (where $SD=24.25$). The 95% confidence interval for the difference of means was quite wide (i.e. ranging from -8.018 to 11.156) Therefore, we can conclude that the students in the sample did

not present a significant difference in their reading comprehension profiles in comparison to their fifth-grade peers. Therefore, the assumption for the sample's representativeness is supported.

An independent samples t-test was conducted to test the null hypothesis that the students found in the sample (n=42) did not possess the same reading comprehension profile as the students found in the other fifth-grade classrooms (n=70). The test results are presented in graph 5. The t-test finding indicated an acceptance of the null (i.e. there was no significant difference in reading comprehension profiles of the sample and overall population). Moreover, this result was found to be significant at the ninety-five percent confidence level: where $t(110) = .324, p = .75$. This result supports the research hypothesis that there are no differences in the means of the reading comprehension abilities of the sample and the overall fifth grade class.

Table 5. Group Statistics: Reading Comprehension

Classroom designation			Statistic	Bias	Std. Error	95% Confidence Interval	
						Lower	Upper
GRADE Percentile	sample	N	42				
		Mean	53.51	-.12	3.95	45.49	61.31
		Std. Deviation	26.113	-.386	1.892	21.979	29.377
		Std. Error Mean	3.982				
	other	N	70				
		Mean	51.94	-.07	2.87	46.05	57.42
		Std. Deviation	24.249	-.175	1.556	20.900	27.179
		Std. Error Mean	2.898				

Table 6. Independent Samples Test: Reading Comprehension (GRADE)

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GRADE Percentile	Equal variances assumed	.799	.373	.324	111	.746	1.569	4.838	-8.018	11.156
	Equal variances not assumed			.319	83.944	.751	1.569	4.925	-8.226	11.363

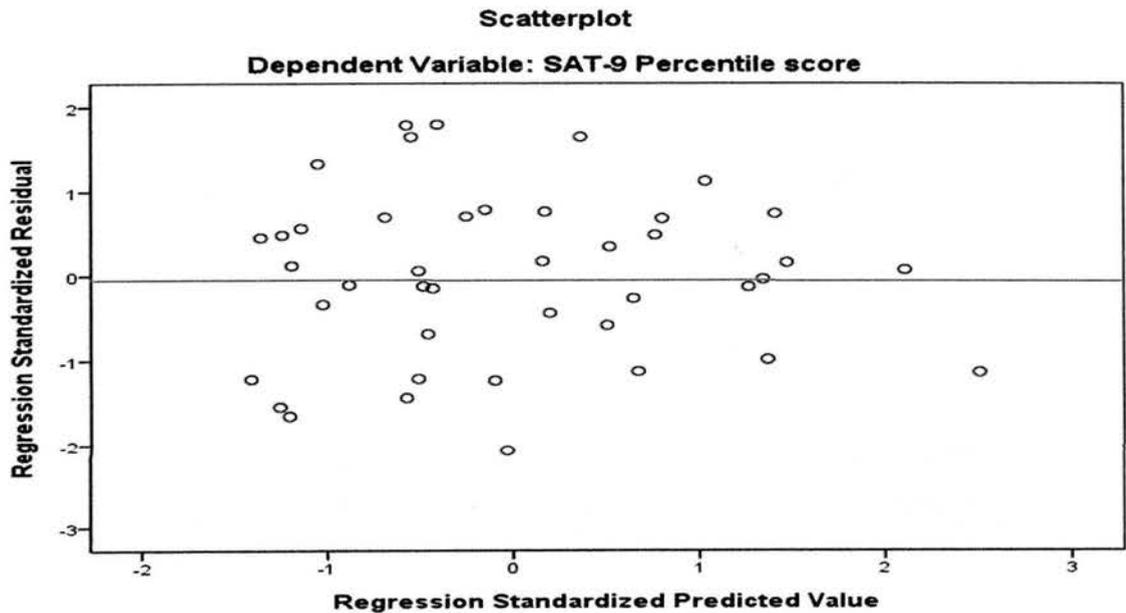
Question 1: Student Reading Volume and Reading Comprehension

Before an analysis of the regression data can be completed we must first confirm that three key assumptions for carrying out an ordinary least squares regression have been met. These are the assumptions of (1) *homoscedasticity* of the residuals, where each level of the predictor should have the same variance (2) the presence of a *normal distribution of errors*, where the differences between the model and the observed data are very close to zero (3) *the independence of errors*, where any two observations of the residual terms are uncorrelated (i.e. independent). The charts and statistics provided below will confirm that these assumptions have been met.

Assumption 1: Homoscedasticity

The scatter plot of graph 4 allows a visual confirmation of the presence of residual outliers (i.e. those scores that lie outside the dominant pattern of the distribution). The identification of outliers is critically important for regression analysis, because their presence adversely skews both the coefficient statistics (i.e. Pearson Product) and the measurement of the amount of shared variance (i.e. the coefficient of determination). Graph 4 represents the distribution of student scores for reading volume and reading comprehension. It plots the distribution of z-scores for standardized residuals/errors (ZRESID) and Standardized Predicted Values (ZPRED).

Figure 4. Regression Plot of Standardized Residuals/Errors (ZRESID) and Standardized Predicted Values (ZPRED).

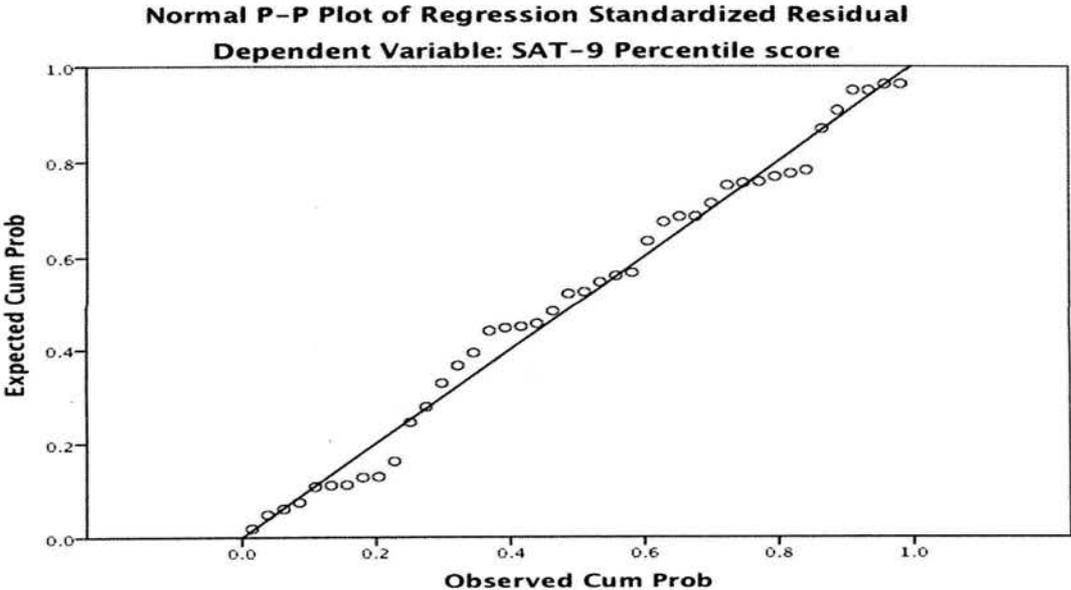


As is clearly seen, the scatter of the data points is not funnel shaped, which would indicate a pattern indicative of heteroscedasticity. Instead the scores are randomly distributed throughout the data. This pattern of distribution confirms that the assumption of homoscedasticity has been met.

Assumption 2: Normality of Residual Errors

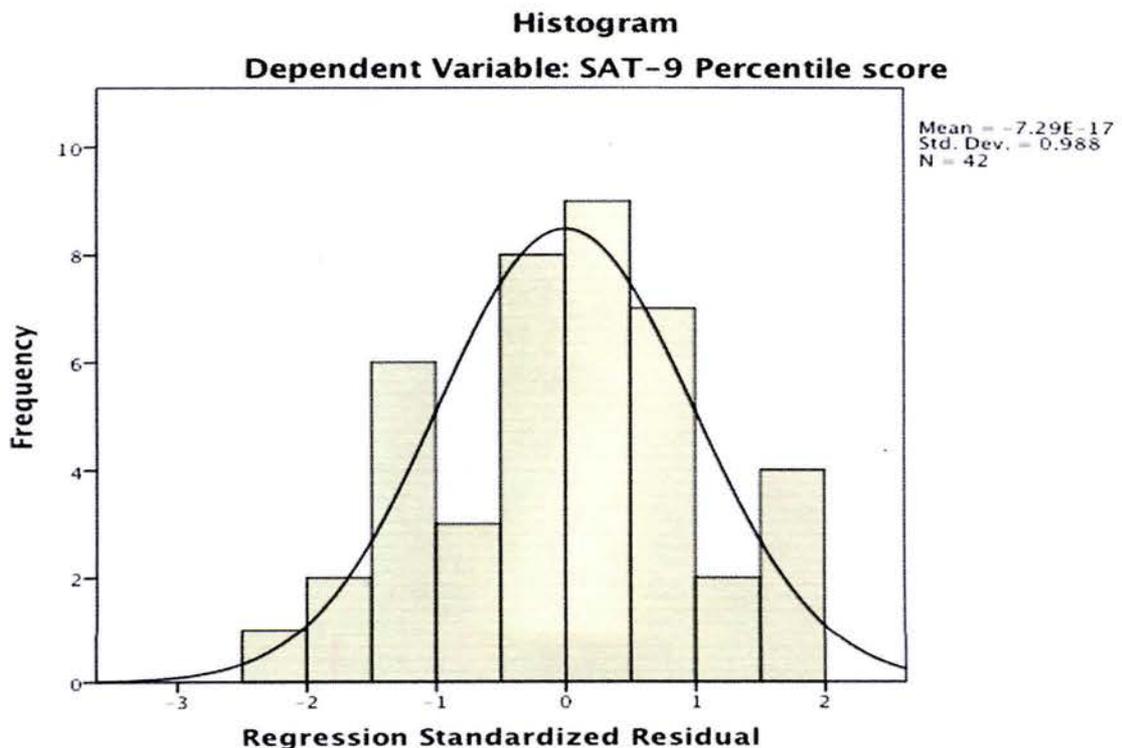
The second, closely related, assumption for regression analysis concerns the distribution of the *normality of the residual errors*. This assumption can be evaluated by way of the data patterns produced by the histogram (Graph 5) and P-Plot (Graph 6) produced below. These graphs both represents the data distribution for the students (n=42) reading comprehension scores on the SAT-9 reading achievement test.

Figure 5. Standardized Residuals for Reading Comprehension (SAT-9)



As is clearly evident, the scatter of the data distribution of scores is closely clustered around the regression line. This indicates that none of the scores lie significantly outside the normal range (i.e. constitute problematic outlier scores). This visually confirms that the assumption of the normalcy of the distribution of residual errors has been met. A second graphic representation of this assumption is represented in the form of the histogram below (i.e. graph 6). A normal distribution curve has been superimposed on the distribution of residuals.

Figure 6. Reading Comprehension Frequency Distribution (SAT-9)



This pattern of scores is representative of a normal distribution, confirming that this assumption has been met.

Assumption 3: Presence of Significant Outlier Scores

A third assumption of regression analysis concerns the presence of significant outlier scores in the data distribution. While this was visually assessed for homoscedasticity above (figure five) this assumption can be statistically assessed by means of running a Durbin-Watson test.

Table 7. Model Summary of Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.372 ^a	.138	.117	22.950	.138	6.420	1	40	.015	1.951

a. Predictors: (Constant), Reading Volume

b. Dependent Variable: GRADE Percentile

As can be seen, the Durbin Watson test for serial correlations between errors, produced a statistic of 1.951. (This test statistic varies from 0 to 4, with a value of 2 indicating that no residuals are uncorrelated). The statistic of 1.951 indicates the absence of significant outliers in the sample's distribution. Therefore we can confirm that this particular assumption for a least squares regression has also been met.

Conclusion Concerning Assumptions for Least Squares Regression

In conclusion, our analyses confirm that all three of these major assumptions for the generalizability of a regression model have been met. Therefore, we can confidently move onto the results for the first research question.

Question #1: Reading Volume as a Predictor of Reading Comprehension.

Having confirmed that the key assumptions for an ordinary least square regression have been met, the following section will provide the results for the study's first research question. The hypothesis for this first research question is that a student's nightly reading volume will be a statistically significant predictor of his/her reading comprehension achievement. The following section will provide evidence which supports this hypothesis.

The steps towards a full evaluation of a final fitted model - for research question one - involved fitting a full taxonomy of models and variables that addressed student reading habits. We began by fitting an OLS regression model in which reading volume served as the independent variable and student reading comprehension was the dependent variable (this was measured by way of student percentile scores on the *GRADE Assessment for Reading Achievement*). Next, we added student gender to the model as a demographic control variable. We did this because student gender had been identified as a mediating variable in one of the regression studies discussed earlier in the review of literature (e.g. Greaney, 1980).

The results for this regression analysis are found on table eight. Moreover, they support the research hypothesis. Student nightly reading volume was found to be a statistically significant predictor for student reading comprehension ability – the Beta level of 1.2 was found to be significant at a $p=.015$. Moreover,

the correlation coefficient of determination (R^2) indicated that reading volume accounted for approximately fourteen percent of the overall variance.

However, the results also indicate that when student gender was added, as a second step predictor variable, the resultant beta-level of 10.38 did not meet the ninety-five percent level of significance (i.e. $p=.214$). Therefore, gender is not assumed to operate as significant explanatory variable for the relationship between student reading volume and student reading comprehension ability.

Table 8. Full Taxonomy of the Relationship of Reading Volume & Reading Comprehension (GRADE)

Fixed Effect	Estimated Beta	Standard Error Beta	β
Step 1			
Constant/intercept	39.803	6.54	
Reading Volume	1.2	.461	.372**
Step 2			
Constant/intercept	54.159	11.79	
Reading Volume	1.3	.462	.409**
Student's Gender	10.38	7.10	.214

Note: $R^2 = .14^{**}$ for Step 1; $\Delta R^2 = .18$ for Step 2 (* $p < .01$, ** $p < .05$, *** $p < .01$)

The significant beta result for the taxonomy is now placed within a final fitted model for the first regression model. The results, measuring the strength and significance of the relationship between students' nightly reading volume and their reading comprehension achievement, are found in table nine.

Table 9. Final Fitted Model for Student Reading Volume and Reading Comprehension (GRADE Assessment)

Fixed Effect	Beta-Estimate	Se	T-ratio	p-value	R	R ²
Reading Volume	1.2	.461	2.53	.015	.372	.138

These results indicates that student nightly reading volume provided a significant predictor of reading comprehension achievement – where $t(42) 2.53$, $p=.015$. Moreover, student reading volume provides an explanation for approximately fourteen percent of the possible variance. This result is not only statistically significant, but it broadly aligns with the findings of the regression studies found in the review of the literature. The educational significance of the findings for this model will be discussed in the next chapter.

The next step addresses the decision to test the two dimensions of the construct of reading comprehension. (This was previously described in chapter three) Many scholars within the various fields of literacy research have stressed that the construct of reading comprehension is not monolithic in nature. They have suggested the need for a more nuanced measurement of the multiple aspects of reading comprehension (Alvermann & Eackle, 2003; Darling-Hammond &

Bransford, 2005; Duke, Pressley & Hilden, 2004; Snow, Burns & Griffin, 2005; Sweet & Snow, 2003). Therefore, the research design of the present study included a binary-variable division in the evaluation of the construct of reading comprehension. Students reading comprehension ability (i.e. their ability to answer text explicit and inferential questions) became the focus of a second regression model, while the sophistication of student vocabulary knowledge became a third. This construct distinction was operationalized by way of the students' scores on the two subtests of the *SAT-9 Reading Achievement Assessment*. These standardized scores measure the two reading comprehension attributes described above.

The first of these factors examined the strength and significance of the relationship between student reading volume and a more refined/nuanced measurement of the construct of student reading comprehension ability. The results are found in table ten, and they also support the study's research hypothesis.

Table 10. Full Taxonomy of the Relationship of Reading Volume & Reading Comprehension (SAT-9)

Variable	Estimated Beta	Standard Error Beta	β
Step 1			
Constant/intercept	39.291	6.762	
Reading Volume	1.364	.476	.412***
Step 2			
Constant/intercept	37.085	12.504	
Reading Volume	1.364	.490	.407***
Student's Gender	1.588	7.535	.31

Note: $R^2 = .17^{**}$ for Step 1; $\Delta R^2 = .17$ for Step 2 (* $p < .01$, ** $p < .05$, *** $p < .01$)

The results of this full taxonomy of models indicates that student nightly reading volume does provide a statistically significant predictor for the SAT-9 sub-test for student reading comprehension ability – the Beta level of 1.364 was found at a $p=.007$ level of significance. Moreover, the correlation coefficient of determination (R^2) indicated that reading volume accounted for approximately seventeen percent of the overall variance. However, when step two was added then gender proved to not provide a statically significant predictor variable – the beta level for the student gender was 1.59, where $p=.31$.

The significant beta result for this taxonomy is now placed within a final

fitted model for the first regression model. The results for the second model, measuring the strength and significance of the relationship between students' nightly reading habits and their reading comprehension achievement on the *SAT-9 Reading Achievement Assessment*, are found in table eleven.

Table 11. Final Fitted Model for Student Reading Volume and Reading Comprehension (Sub-Test SAT-9)

Fixed Effect	Beta-Estimate	Se	T-ratio	p-value	R	R ²
Reading Volume	1.5	.476	2.863	.007	.412	.170

These results indicate that student nightly reading volume provides a significant predictor of this second measure of reading comprehension ability – where $t(42) = 2.863, p = .01$. Moreover, the statistical significance of the reading volume predictor provides an explanation for approximately seventeen percent of the possible variance. This result is not only statistically significant, but it broadly aligns with the findings of the regression studies outlined in the review of the literature. The educational significance of the model's findings will be discussed in the next chapter.

Finally, a third regression model was fit in which student receptive reading vocabulary abilities operated as an outcome variable. The results for this this taxonomic model is found in table twelve.

Table 12. Full Taxonomy of the Relationship of Reading Volume & Reading Vocabulary (SAT-9 Sub-Test)

Variable	Estimated Beta	Standard Error Beta	β
Step 1			
Constant/intercept	32.628	7.402	
Reading Volume	1.238	.521	.351***
Step 2			
Constant/intercept	46.799	13.423	
Reading Volume	1.354	.526	.384**
Student's Gender	10.204	8.09	.188

Note: $R^2 = .12^{**}$ for Step 1; $\Delta R^2 = .16$ for Step 2 (* $p < .01$, ** $p < .05$, *** $p < .01$)

The results of this table also support the research hypothesis: student nightly reading volume provided a statistically significant predictor for student reading vocabulary ability – the Beta level of 1.24 was found to be significant at a $p=.022$ level of confidence. Moreover, the correlation coefficient of determination (R^2) indicated that reading volume accounted for approximately twelve percent of the overall variance.

However, when step two added student gender to the regression model it proved not to provide a significant prediction of reading vocabulary knowledge –

the beta level for the student gender was 10.2, where $p=.22$. And so we have excluded it from the final fitted model for reasons of parsimony.

The results of the final fitted model, measuring the strength and significance of the relationship between students' nightly reading habits and their reading vocabulary ability, are presented in table thirteen.

Table 13. Final Fitted Model for Student Reading Volume and Reading Vocabulary (Sub-test SAT-9)

Fixed Effect	Beta-Estimate	Se	T-ratio	p-value	R	R ²
Reading Volume	1.2	.521	2.375	.022	.351	.124

These results confirm that student nightly reading volume does provide a significant predictor of student receptive vocabulary knowledge – where $t(42) = 2.375, p=.02$. Moreover, this predictor provides an explanation for approximately twelve percent of possible variance. This result is not only statistically significant, but it broadly aligns with the findings of the regression studies found in the review of the literature. The educational significance of these findings will be discussed in the next chapter.

Conclusions concerning of Final-fitted Models for Research Question One

Taken as a whole, all three models confirm the research hypothesis: student nightly reading volume proved to be a significant predictor variable vis-à-vis multiple measures of reading achievement.

However, the beta-level results for student gender did not provide a significant level of confidence, and this was the case for all three reading comprehension outcomes. Therefore, student gender will be excluded from the discussion of the final fitted model for research question one.

Research Question #2: Reading Volume & Writing Ability.

Before an analysis of the results for the second research question can be carried out we must again confirm that the critical assumptions for regression have been met. As was the case for the first research question, the three key assumptions required for an ordinary least squares regression analyses are *homoscedasticity*, the *independence of residual betas*, and the *presence of a normal distribution of errors*. The charts and statistics provided below will confirm that these assumptions have been successfully met.

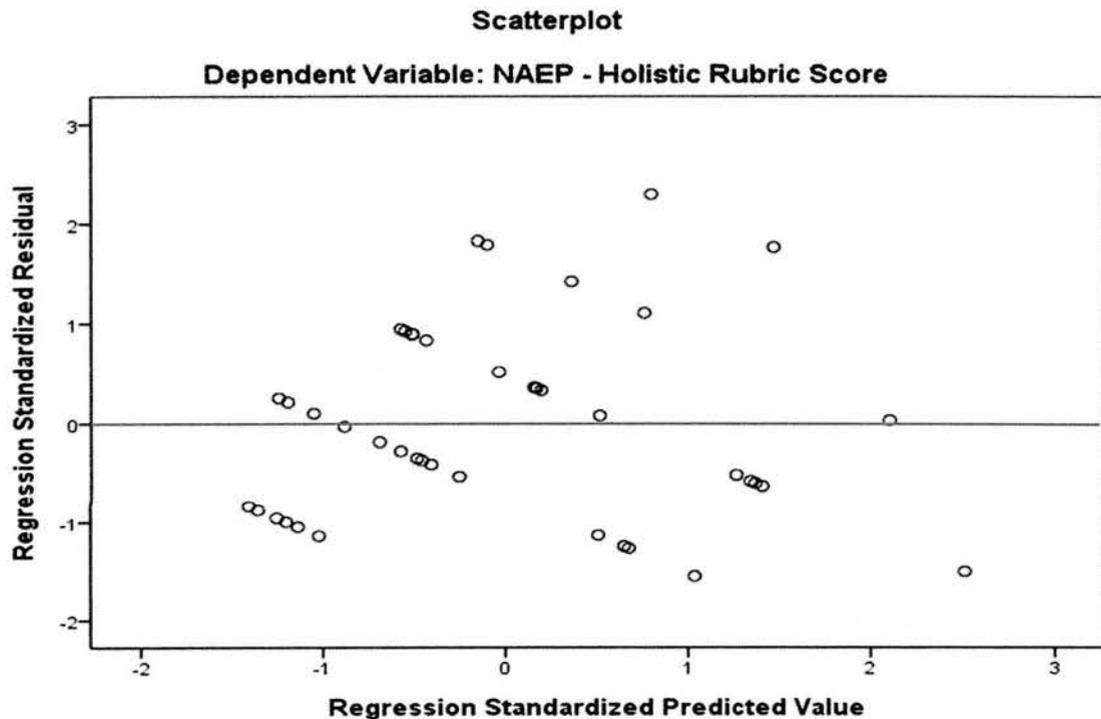
Assumption 1: Homoscedasticity

Scatter plots, histograms and P-P plots have been generated to visually detect the presence of residual outlier scores (i.e. scores that lie outside the dominant pattern of the distribution of the regression). The identification of

such outlier scores is critically important, because their presence adversely skews coefficient statistics (i.e. Pearson Product) and the measurement of shared variance (i.e. the coefficient of determination).

Graph eight represents the distribution of student scores for students' average nightly reading volume and their overall qualitative score for writing ability. This was measured by way of a qualitative score on the holistic rubric of the NAEP. Graph eight tracks the distribution of scores for standardized residuals/errors (ZRESID) and standardized predicted values (ZPRED).

Figure 7: Regression Plot of Standardized Residuals/Errors (ZRESID) and Standardized Predicted Values (ZPRED).



As can be clearly seen, the scatter of the data points is not funnel shaped (i.e. a heteroscedastic pattern of the distribution). Instead, the scores are randomly distributed throughout the graph. Although the pattern of student scores is somewhat complicated by the ordinal scoring scale for the NAEP's rubric range (i.e. a raw score ranging from between 1-6), nevertheless, the randomness of the scatter pattern of scores is clearly evenly distributed for ZRESID and ZPRED. This pattern of distribution confirms that the assumption of homoscedasticity has been met.

Assumption 2: The Normality of Residual Errors

The second assumption for a least squares regression analysis concerns the distribution of the normality of the residual errors. This assumption was visually assessed by way of examining both the histogram (Figure 9) and P-Plot (Figure 8) for data patterns for residuals. These represents the data distribution for the students' (n=42) writing ability on the NAEP assessment.

Figure 8: Standardized Residuals for Writing Ability (NAEP)

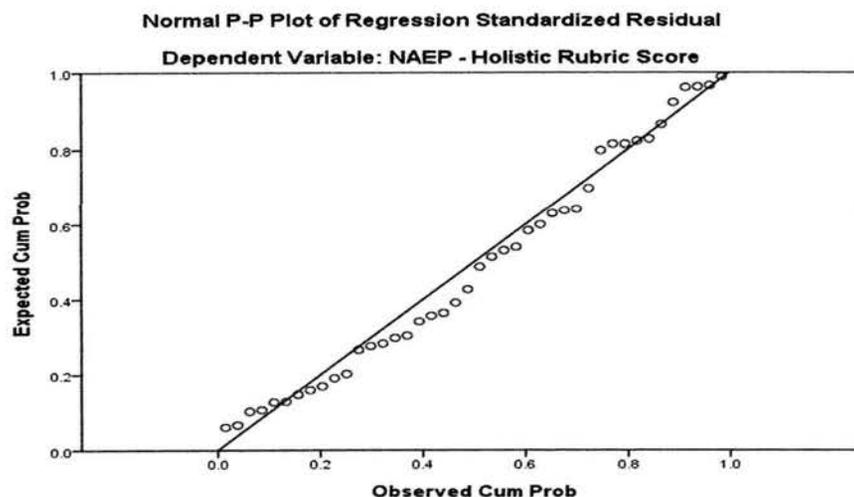
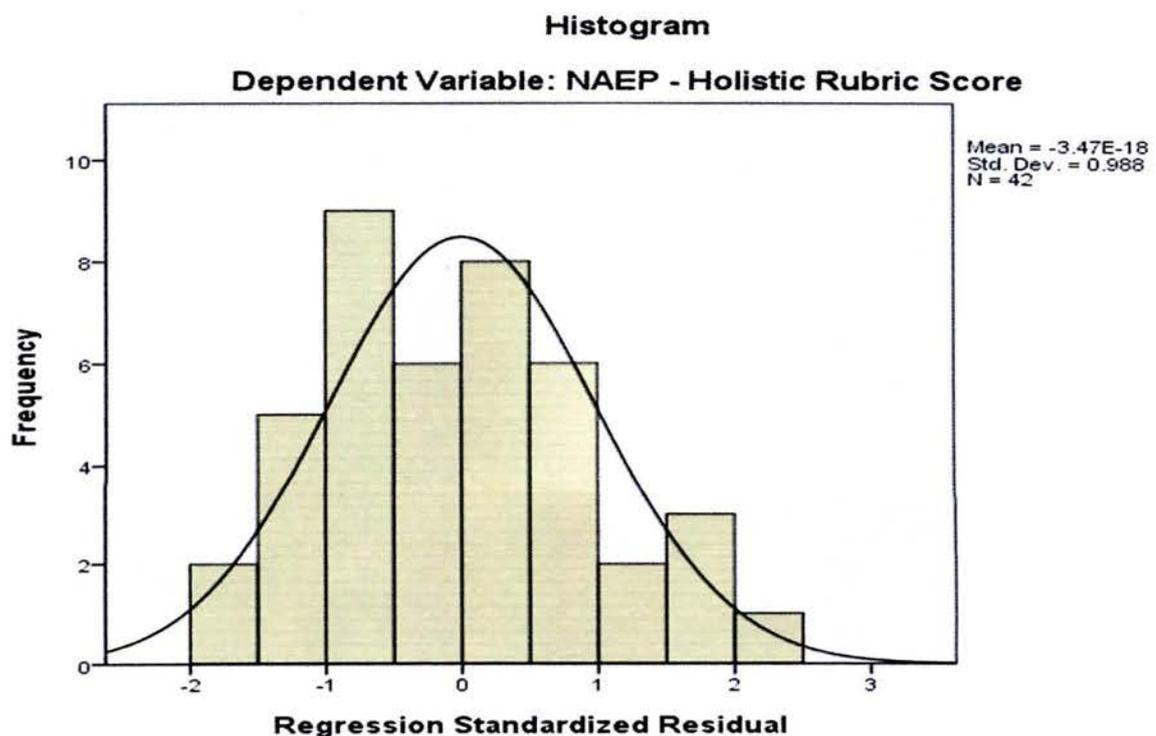


Figure eight confirms that the scatter pattern, for the distribution of scores, are predominantly clustered around the least squares regression line. This indicates that none of the residual error scores lie significantly outside the normal range (i.e. constitute problematic outlier scores) of the regression model. This visually confirms that assumption of the normalcy of the distribution of residual errors has been met. A second graphic representation of this assumption is represented in the form of the histogram below (i.e. Figure 9). A normal distribution curve has been superimposed on the distribution of scores for residuals.

Figure 9: Normalcy of Distribution of Residual Scores for Writing Ability



Evidently, the pattern of the distribution of scores is representative of a normal distribution. This provides a second confirmation that the assumption - of the normality of residual errors - has been met.

Assumption 3: Presence of Significant Outlier Scores

A third assumption requires for a least squares regression analysis concerns the presence of significant outlier scores in the data distribution. This assumption can be assessed by means of the Durbin-Watson test.

Table 14. Model Summary for Reading Volume & Writing Outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.626 ^a	.392	.377	.819	.392	25.776	1	40	.000	2.426

a. Predictors: (Constant), Reading Volume

b. Dependent Variable: NAEP - Holistic Rubric Score

As can be seen in table fourteen, the Durbin Watson test - for serial correlations between errors - produced a statistic of 2.42. (The Durbin-Watson test statistic varies from 0 to 4, with a value of 2 indicating that no residuals are uncorrelated.) The statistic of 2.43 indicates the absence of any significant outliers scores in the sample's distribution. Therefore, we can confirm that this final test of the assumption has been met.

Conclusion concerning Assumptions for Least Squares Regression

The analysis of the data confirms that all three major assumptions - for the validity of a regression model - have been successfully met. Therefore, we can proceed to an analysis of the regression results for the second research question.

Research Question #2: Reading Volume as a Predictor of Writing Ability

Having confirmed that the key assumptions for an ordinary least square regression have been met, the following section will provide the results for the study's second research question. The hypothesis, for the second research question, remains that of the first - student reading volume provides a statistically significant predictor for writing achievement. The results provided in this section will support this research hypothesis.

The steps towards a full evaluation of a final fitted model, for research question two, involved providing a full taxonomy of models and variables for writing achievement. We began by fitting an OLS regression model - where student reading volume was the independent variable and writing ability was the dependent variable (this was measured by way of qualitative scores on the *NAEP Holistic Rubric*). Next, we added student gender to the model as a demographic control variable. We did this because student gender was identified in the review of the literature as a significant explanatory factor for student writing achievement (Byrnes & Wasik, 2009; Hillocks, 2008; Langer & Fihan, 2000; Nelson, 2008; NRC, 2002; Tierney & Shanahan, 1991).

The results for this regression analysis are found on table sixteen. They support the research hypothesis. Student nightly reading volume proved to provide a statistically significant predictor for student writing – the Beta level of 4.69 was found to be significant at a $p=.01$. Moreover, the correlation coefficient of determination (R^2) indicated that reading volume accounted for approximately thirty-nine percent of the overall variance.

However, the results also indicate that when student gender was added, as a second step predictor variable, the resultant beta level of .508 did not meet the ninety-five percent level of significance (i.e. $p=.80$). Therefore, student gender is not assumed to provide a significant explanatory variable for the relationship between reading volume and writing ability.

Table 15. Full Taxonomy of the Relationship of Reading Volume & Writing Ability (NAEP Holistic Rubric)

Fixed Effect	Estimated Beta	Standard Error Beta	β
Step 1			
Constant/intercept	-2.47	2.579	
Reading Volume	4.69	.924	.626***
Step 2			
Constant/intercept	-.875	3.570	
Reading Volume	4.638	.961	.618***
Student's Gender	.508	1.972	.033

Note: $R^2 = .39$ for Step 1; $\Delta R^2 = .39$ for Step 2 (* $p < .01$, ** $p < .05$, *** $p < .01$)

Final Fitted Model for Research Question Two

The final fitted model, measuring the strength and significance of the relationship between students' nightly reading volume and their writing ability, is presented in table seventeen.

Table 16. Final Fitted Model for Student Reading Volume and Writing Ability

Fixed Effect	Beta-Estimate	Se	T-ratio	p-value	R	R ²
Reading Volume	4.693	.924	5.077	.01	.626	.392

These results indicates that student nightly reading volume did provide a significant predictor of student writing ability – where $t(42) 5.08, p=.01$. Moreover, the results also indicate that student reading volume provides an explanation for approximately thirty-nine percent of possible variance. This result is statistically significant, and broadly aligns with the findings outlined in the review of the literature. The educational significance of the findings for this model will be further discussed in the next chapter.

Reading Volume and 6-Traits of Writing

Finally, the second research question not only involved a regression analysis of the relationship between students' nightly reading volume and their overall writing ability, it additionally sought to verify if specific aspects or traits of writing ability manifested a stronger relationship to reading volume than others.

This measurement was operationalized by way of a correlational analysis of student reading volume rates to the National Writing Project's, *6-traits (Analytic) Writing Rubric*.

The results of this set of zero-order (bivariate) correlations are presented by the correlation matrix presented in table eighteen. It is of particular importance to note that all of the correlation coefficients turned out to be significant at the $p=.01$ level. Therefore, we can infer a high level of confidence for these results.

Table 17. Correlation Matrix for Student Reading Volume and the 6-Traits of Writing Ability (NWP)

		Reading Volume	NWP Trait 1 - IDEAS	NWP Trait 2 - Organization	NWP Trait 3 - Voice	NWP Trait 4 - Word Choice	NWP Trait 5 - Sentence Fluency	NWP Trait 6 - Conventions
Reading Volume	Pearson Correlation	1	.615**	.581**	.505**	.540**	.515**	.469**
	Sig. (2-tailed)		.000	.000	.001	.000	.000	.002
	N	42	42	42	42	42	42	42
NWP Trait 1 - IDEAS	Pearson Correlation	.615**	1	.878**	.913**	.849**	.844**	.807**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	42	42	42	42	42	42	42
NWP Trait 2 - Organization	Pearson Correlation	.581**	.878**	1	.896**	.825**	.833**	.786**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	42	42	42	42	42	42	42
NWP Trait 3 - VOICE	Pearson Correlation	.505**	.913**	.896**	1	.877**	.805**	.774**
	Sig. (2-tailed)	.001	.000	.000		.000	.000	.000
	N	42	42	42	42	42	42	42
NWP Trait 4 - WORD CHOICE	Pearson Correlation	.540**	.849**	.825**	.877**	1	.765**	.777**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	42	42	42	42	42	42	42
NWP Trait 5 - SENTENCE FLUENCY	Pearson Correlation	.515**	.844**	.833**	.805**	.765**	1	.891**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	42	42	42	42	42	42	42
NWP Trait 6 - CONVENTIONS	Pearson Correlation	.469**	.807**	.786**	.774**	.777**	.891**	1
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	
	N	42	42	42	42	42	42	42

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation Matrix Results:

A set of correlation coefficients was carried out, which examined the strength of relationship between student reading volume and six analytic writing traits. Using the Bonferroni approach - to control for Type I errors - a p -value of .007 ($07/10 = .007$) was required to confirm a statistically significant result.

The results of the correlation analyses are presented in table nineteen. The results attest that all seven of the correlation coefficients were found to be statistically significant. These set of correlation coefficients support the research hypothesis (i.e. that a student's reading volume is 'highly' correlated with his/her writing achievement). In general the results suggest that students who read a lot tend to produce superior written products, and they do so across all six traits of writing ability.

The inter-correlational relationships of student reading volume and their writing abilities are represented by table nineteen. As can be seen, while writing 'conventions' produced a medium effect for its correlation coefficient (i.e. $r=.47$), all five of the other writing variables produced 'large' correlational effects sizes (i.e. where $r > .50$). A discussion of the educational significance of this finding will be presented in the next chapter.

Table 18. Correlations among the Seven Literacy Variables (N=42)

	Reading - Volume	Ideas -	Organization -	Voice -	Word - Choice	Sentence- Fluency	Conventions
Reading Volume	1						
Trait 1 - Ideas	.62**	1					
Trait 2 - Organization	.58**	.88**	1				
Trait 3 - Voice	.51**	.91**	.87**	1			
Trait 4 - Word Choice	.54**	.85**	.83**	.88**	1		
Trait 5 - Sentence Fluency	.52**	.81**	.83**	.81**	.77**	1	
Trait 6 - Conventions	.47**	.81**	.77**	.75**	.78**	.89**	1

** Correlation is significant at the $p < .01$ level (1-tailed).

Chapter 5: Discussion and Future Recommendations

The present study produced two major findings. The first identified a positive significant relationship between the average amount of time students spent in out-of-school reading and their reading comprehension abilities, $r = .37$ (42), $p < .05$: student reading volume provided an explanation for fourteen percent of shared variance (R^2). The second finding identified an even stronger predictive relationship between reading volume and writing abilities, $r = .63$, (42), $p < .05$: reading volume provided an explanation for thirty-nine percent of possible variance (R^2). Taken together, these two findings confirm the strength of the regression model: students' nightly reading volume (predictor variable) provided a significant explanation for both their reading and writing abilities (outcome variables).

Question 1: Reading Volume and Reading Comprehension

The generalizability of the findings of decades of reading volume research has been characterized by Cunningham and Stanovich (2004) in the following terms: "Researchers and practitioners in the reading education community are nearly unanimous in recommending that children be encouraged to spend more time engaged in literacy activities outside of school. From a cultural standpoint, this finding is unassailable" (p. 302). This unassailability is supported by the robustness of the findings of studies outlined in the review of the literature (Anderson et al., 1988; Cipelewski & Stanovich, 1992; Greaney, 1982; McBride-

Chang et al, 1993; Taylor, Frye & Maruyama, 1990; Guthrie, 2004; Walberg & Tsai, 1984).

The review of the literature attested to the presence of a wide range in the effect-size results found in reading volume studies. The strength of these bivariate relationships ranged from $r=.10$ (2,890), $p<.05$ in Walberg & Tsai (1984) to $r=.41$ (155), $p<.05$ in Anderson et al. (1988). The strength of the present study's correlation coefficient (i.e. $r= .37$ (42), $p<.05$) is consistent with those of previous reading volume studies (Anderson, Wilson & Fielding, 1988; Cipielewski & Stanovich, 1992; Cunningham & Stanovich, 1991; Greaney, 1980; McBride-Chang et al, 1993; Taylor, Frye & Maruyama, 1990; Walberg & Tsai, 1984). This means that the discussion of the educational importance of the study's findings take place within the 'unassailable' research consensus to which Cunningham and Stanovich (2004) alluded. However, the present study provides a useful addition to the extant scholarship in terms of the sample considered.

Anderson, Wilson & Fielding, 1988

As was stated in the review of the literature, Anderson, Wilson and Fielding's study, *Growth in reading and how children spend their time outside of school* (1988), is the most frequently cited study found in discussions of reading volume research.

However, the Anderson et al. (1988) study drew its sample from a predominantly suburban middle-income/SES population. Indeed the authors

themselves pointed to this sample-characteristic as limitation of the generalizability of their findings; “Although there were some blue collar, low-income, and minority children in the sample, these groups were underrepresented in terms of their proportions in the nation as a whole” (p. 287). In contrast, the present study’s sample was drawn from an urban school site comprised predominantly of students from low-SES backgrounds. This difference in sampling characteristics is important because student SES has been repeatedly identified as a key explanatory variable belying the ‘student achievement gap’ (Byrnes & Wasik, 2009; Chall, 2000; Darling-Hammond & Bransford, 2005; Nelson, 2008; Stanovich, 2000; Taylor, Frye, & Maruyama, 1990). Based on the findings for research question one, the present study suggests that student reading volume is as significant a predictor of reading comprehension abilities among low SES students as it was for the higher SES sample of students - found in Anderson et al.’s study.

Anderson et al. concluded their discussion of the significance of their study’s findings with the claim that:

In sum, the principal conclusion of this study is that the amount of time a child spends reading books is related to the child's reading level in the fifth grade and growth in reading proficiency from the second to the fifth grade. The case can be made that reading books is a cause, not merely a reflection, of reading proficiency. Although this case falls short of being conclusive, it is as strong as the case for any other practice in the field of reading, in or out of school (p. 302).

While recognizing the limited generalizability of the present study’s findings (due to its small sample size), perhaps the most significant implication

of the present study is that Anderson et al.'s strongly worded conclusion may be extended to the urban fifth-grade students found in this study. Reading volume would seem to be just as important for urban students as is the case for their suburban peers.

Research Question Two: Student Reading Volume and Writing Achievement

The present study found a significant predictive relationship between the amount of time that students spent in nightly reading and the quality of the writing found in their journals (i.e., $r=.63$ (42), $p<.05$). Perhaps the most intriguing finding of the study is that students' nightly reading volume provided an even stronger predictor of writing ability than was the case with reading comprehension: while reading volume explained eighteen percent of shared variance for reading comprehension, it explained thirty-nine percent of the shared variance for writing achievement

None of the reading volume studies outlined in the review of the literature employed a measurement of student writing abilities among their dependent variables. This makes the discussion of the results of research question two somewhat problematical, because we cannot directly draw on the findings of comparable studies. Therefore, the discussion of significance will turn to the wider argument found in reading and writing research.

The findings of the present study confirm a positive relationship between students reading behavior - in this instance their nightly reading volume habits-

and their writing abilities. This finding aligns with the research's assertion of a strong relationship existing between students' reading comprehension level and their writing abilities (Cox, Shanahan & Tinzman, 1994; Graham & Herbert, 2011; Langer, 1986, 2001; Nelson, Spivey & King, 1989; Shanahan, 1984; Tierney, Flanagan & McGinley, 1989; Webster & Ammon, 1994).

Graham and Herbert's (2011) recent meta-analysis, of nine experimental and quasi-experimental studies, addressed the question of whether an increase in how much students wrote improved how well they read. Their comparison of the strength of effect-sizes (f-statistic results) confirmed that this was indeed the case: "We found that writing instruction increases students reading achievement...the findings for the impact of writing instruction on reading comprehension applied to grades 4-12" (p. 731).

What makes Graham and Herbert's conclusions applicable to the discussion for the present study's findings is that both address the variable strength/effect of the amount of time that students spend immersed in literacy behavior; albeit the ordering of variables is reversed (i.e. the present study placed writing as the dependent variable, while their meta-analysis placed writing as the independent variable). In both the present study and in Graham and Herbert's meta-analysis, the time/exposure that a student spends in reading-writing tasks reciprocally affects their overarching literacy abilities. The findings for research question two suggest that a transactional relationship exists between student

reading and writing behavior, and this mirrors the conclusions drawn from Graham and Herbert's review.

Moreover, their representation of the educational implications of their meta-analysis is also germane to this discussion: "...our findings provide empirical support for teachers who currently use writing as a tool to enhance students' comprehension of the text they read" (p. 737). The results for research question two come to the same conclusion - except that they encourage teachers to use students' reading volume as a tool to enhance students' ability to express their reading comprehension in a written response. Although the research literature is clear that the reading and writing domains should not be understood as being identical in nature (Graham & Perin, 2007; Langer & Fihan, 2000; Tierney & Shanahan, 1991), nonetheless, the research is clear that both domains are interrelated. The classroom implications of this research argument are that teachers should be encouraged to view student literacy instruction in light of this nuanced interrelationship (Hillocks, 2006; Langer & Applebee, 1986; Nelson, 2008):

Writing is a particularly valuable way of encouraging deep thinking, but it is likely to be even better when used in combination with other ways of thinking (e.g. reading, speaking, listening, viewing)...Having students write and rewrite about some aspect of a concept is valuable. Having them do this in the context of reading is much more powerful. (Shanahan, 2004, p. 69).

The findings of the present study argue for an instructional increase in the time students spends in reading in order to strengthen their writing ability, and for creative interventions to promote reading outside of school. In so arguing, the findings for research question two are consistent with the consensus position of previous reading-writing research.

Directions for Future Research

The four recommendations proposed here relate to a strengthening of aspects of a future study's research design. The first recommendation would be to increase the size of the sample in any future study This approach would be advantageous because it would allow the subsequent discussion of findings to engage the question of generalizability, and so would allow for a comparison of results with those of similarly designed reading volume studies.

The second recommendation would be that of carrying out a regression study that employed a cross-sectional analysis of two distinct SES samples. Such a study would incorporate data collection at two independent school sites. The first site would be in an urban school district, and would provide a demographic sample of low SES students. The second site would be located in a suburban school setting - predominantly comprising of high SES students. This more theoretically nuanced choice of research design would constitute a major improvement on the present study's employment of a straightforward Ordinary Least Squares Regression model.

The third recommendation would be that of incorporating many more predictor variables into the regression model. Given the robust predictive strength of the Matthew effects theory, the employment of a hierarchical regression analysis, with multiple predictor-variables, would enhance the subsequent discussion of findings. It would do so by assessing the relative strength of multiple regression models, which could include the ordering of predictor variables to include (1) student reading volume, (2) comparative cross-sectional SES cohorts, (3) student gender, (4) school attendance statistics, and (5) student race/ethnicity characteristics. This would allow a discussion of findings to examine the predictive strength of factors that educational researchers include in their understanding of major factors contributing to the student achievement gap.

The final recommendation would be to ensure that any future study addresses two of the key issues that the literacy research community, increasingly, deems to be of critical importance. One such area concerns the engagement of the particular linguistic and literacy contexts of English language learners (Darling-Hammond & Bransford, 2005; Guoeang Li, 2011; Snow, Burns & Griffin, 2005). Studies have identified that the social-discourse and linguistic contexts of many English language learners should not be regarded as being synonymous with that of their native English speaking peers (Ball, 2006; Goldenberg, 2011; Prior, 2006). Therefore, a proposed innovation in the research design would be to employ a qualitative analysis of student oral

discourse, by way of classroom book discussions, in a future study of student reading volume. Researchers could become participant observers of a discussion group, one where ELL students discussed their out of school literacy behavior before proceeding to record their nightly reading behavior on an activity diary. This would provide the means of taking into account the predominantly oral social context of many ELL students' access to literacy (Alvermann, 2011; Lawrence & Snow, 2011; Paratore, Cassano & Shickendanz, 2011).

The reading and writing research communities have also increasingly recognized how important the contribution of popular culture, and the changing nature of social-media, are for our understanding of what is often termed as the 'new literacies' (Coiro, Knobel, Lankshear & Leu, 2010). In her discussion of the classroom practices that should address the new developments of literacy behavior, Alvermann (2011) draws attention to the paucity of studies addressing this new social dimension "...there are few large-scale studies that examine the potential for connecting students' out-of-school interest in popular culture texts with classroom learning" (p. 553). An example of addressing such new literacy behavior would be to have the 'evening activity diary' include an explicit tracking of student reading volume behavior in the medium of electronic/digital text: if students increasingly spend their time reading on electronic-tablets, rather than from paper-based books and magazines, then the tool for measuring their reading habits will have to address this new social reality. Certainly, student in

future studies will, in all likelihood, record their reading behavior on an electronic medium, rather than on paper sheets handed out by the researcher

Conclusion: Reading Volume and Student Achievement

While quantitative research studies of student reading volume began in the 1980s (Anderson, Wilson & Fielding, 1986; Greaney, 1980; Walberg & Tsai, 1984), the argument made for its instructional importance began even earlier (Allington, 1977; Chomsky, 1972; Shaughnessy, 1977). In 2001, Allington reflected that the previous two decades of reading volume research had overwhelmingly supported the contention that “kids need to read a lot if they are to become good readers. The evidence on this point is overwhelming. To ensure that all students read a lot, schools need to develop standards for expected reading (and writing) volume.” (2001, p. 43). Allington argued that student reading volume offers such a convincing explanation for student outcomes that it should operate as the major instructional component for the structuring of school literacy: “The cornerstone of an effective school organizational plan is allocating sufficient time for lots of reading and writing...This plan would encompass grades K-12, not just the elementary grades.” (p. 43).

Allington’s insistence on the critical importance of encouraging student reading volume has in no way diminished over the four decades he has been advocating literacy reforms. In the third edition of his book, *What Really Matters for Struggling Readers: Designing Research-Based Programs* (2011) he writes:

In the past few years we have learned even more about how the volume of reading predicts reading proficiency. Struggling students too often participate in interventions that actually reduce how much reading they do! I am more convinced today than ever before that designating interventions and classroom reading lessons that dramatically expand the amount of reading students do is the essential change that must come if we hope to have everyone reading on grade level” (Allington, 2011, p. ii)

These three quotations from Allington place the present study’s findings within a larger platform of educational reform. The predominant demographic profile of those students who become trapped by the ‘achievement gap’ is that they tend to come from low SES backgrounds (Chall, 2000; Presley, 2006; Snow, Burns & Griffin, 2006). Therefore, given that the students comprising the present study’s sample predominantly come from low SES backgrounds, the findings of this study would suggest that urban educators need to do everything possible to encourage and motivate their students to engage in more reading.

Some examples of what could be done in schools and classrooms to further this goal include the following. Schools need to invest financial resources into the purchasing of interesting and high quality books. Teachers need to do all that they can to nurture independent reading inside of the classroom, and institute creative rewards to help motivate students to read more at home. Schools should avoid short-sighted budget cutting measure such as of laying-off school librarians. The need to create such school and classroom libraries is particularly important, given that these children often live in communities where their local libraries are much less resource rich than those found in more affluent communities (Brinton & Fujiki, 2004; Dickinson & Neuman, 2006; Pressley,

2006). Teachers should ensure that their students have library cards, and organize field trips to familiarize students with public libraries. Teachers should consider the use of instructional strategies such as having students engage in author studies, book clubs, and literature circles, as these would afford opportunities for students to become familiar with books and authors they may not have encountered.

In terms of nurturing writing development, teachers should also consider ways to increase opportunities for writing about books, beyond the practice of journal entries (Charney & Carlson, 2005; Graham, McArthur & Fitzgerald, 2007; Spandel 2009). For example, they could write book reviews, for other students to read. They could also write anticipatory predictions about what will happen next in the books they are reading.

Finally, the findings of this study suggest that student reading volume should be understood to be as a vital component of writing development. Again, the fact that this study was carried out with a sample drawn from an urban population is not without consequence. The efficacy of reading volume for the quality of student writing is located among the very students whose writing abilities are at the heart of their academic struggles (Chall, 2000; Graham & Perin, 2007; Hillocks, 2005). A major implication of this finding is that one should not separate reading instruction from writing development: the two domains of written language form a nexus for instruction (Hillocks, 1994; Applebee, 2000; Nelson, 2009).

The last word goes to a classroom observation of effective reading and writing instruction. Langer's cross-sectional study of urban schools that 'beat the odds' (2001) includes descriptions of highly effective classroom teachers and the instructional approaches they adopt for promoting student literacy achievement. I have included one of Langer's descriptions of such a teacher's classroom. I have done so because it offers an encapsulation of the educational/classroom significance of the present study's findings:

Even after doing their daily sustained silent reading, students wrote for five minutes in their journals about whatever they'd been reading, including feelings and thoughts based on that reading. In all these ways students were making connections between thinking, reading and writing; and thinking, reading, and writing were more and more becoming habitual for the students. (Langer, 2002, p. 96).

Whatever else the findings of this study suggest, one can conclude that having students engage in lots of independent reading, is the bedrock of realizing improvements in literacy development.

Appendix A – Student Evening Activity Diary

Evening Activity Log Student [REDACTED] Date 5/3/07

4	
4:15	
4:30	
4:45	
5	
15	
30	
45	
6	
15	
30	Read
45	
7	
15	Home
30	Eat
45	
8	
15	Eat
30	TV
45	
9	
15	tv
30	shower
45	shower
10	
15	Bed
30	
45	
11	

After School Programs
1. Time spent 3hr mins.

Family & Special Events
1. Time spent 0 mins.

Activity/Sport
1. Time spent in organized event
Event/Sport 40 mins.
What I did Basketball

Free Time
1. Time spent outside playing
0 mins
2. Time spent listening to Music
0 mins
3. Time spent reading for
pleasure mins
Author Gary Pausen
Title Hatchet
4. Talking on phone 0 mins.
5. Watching T.V. 1hr15 mins

School Work
1. Total time spent on
homework 0 mins.
2. Time spent Reading during
homework 30 mins.

Computer & Games
1. Total time spent on the
computer 45 mins.
2. Internet Time surfing
0 Mins
3. E-Mail 0 mins
4. School research on the
Internet 6 mins.
5. X-Box, PS2, Gameboy 45

Appendix B – Fourth-Grade Narrative Scoring guide/NAEP Holistic Rubric

6 Excellent Response

- Tells a well-developed story with relevant descriptive details across the response.
- Events well connected & tie the story together with transitions across the response.
- Sustains varied sentence structure and exhibits specific word choices.
- Exhibits control over sentence boundaries; errors in grammar, spelling, mechanics do not impair understanding.

5 Skillful Response

- Tells a clear story with some development including some relevant details.
- Events are connected in much of the response; may lack some transitions.
- Exhibits some variety in sentence structure & exhibits some specific word choices.
- General control over sentence boundaries; errors in grammar, spelling and mechanics do not interfere with understanding.

4 Sufficient Response

- Tells a clear story with little development; has few details
- Events are generally related; may contain brief digressions or inconsistencies.
- Generally has simple sentences and simple word choice may exhibit uneven sentence boundaries
- Has sentences that consist mostly of complete, clear, distinct thoughts; errors in grammar, spelling and mechanics do not interfere with understanding.

3 Uneven Response

- Attempts to tell a story, but tells only part of a story, gives a plan for a story, or is list-like.
- Lacks a clear progression of events; elements may not fit together or be in sequence.
- Exhibits uneven control over sentence boundaries and may have some inaccurate word choices.
- Errors in grammar, spelling, and mechanics sometimes interfere with understanding.

2 Insufficient Response

- Attempts a response, but is not more than a fragment of the beginning of a story OR is very repetitive.
- Is very disorganized OR too brief to detect any organization
- Exhibits little control over sentence boundaries & formation; word choice is inaccurate in much of the response.
- Characterized by misspellings, missing words, incorrect word order; errors in grammar, spelling, and mechanics are severe enough to make understanding very difficult in much of the response.

1 Unsatisfactory Response

- Attempts a response, but may only paraphrase of the prompt or be extremely brief.
- Exhibits no control over organization.
- Exhibits no control over sentence formation; word choice is inaccurate across the
- Characterized by misspellings, missing words, incorrect word order; errors severely impede the response.

Appendix C – NWP 6-Traits Analytic Rubric

Six-Point Scoring Rubric

	1 Experimenting	2 Emerging	3 Developing	4 Effective	5 Strong	6 Exceptional
Ideas the meaning and development of the message	<ul style="list-style-type: none"> ◦ Searching for a topic ◦ Limited information ◦ Vague details ◦ Random thoughts 	<ul style="list-style-type: none"> ◦ Hints at topic ◦ Reader left with many unanswered questions ◦ Sporadic details ◦ Glimmer of main point 	<ul style="list-style-type: none"> ◦ General topic defined ◦ Reasonably clear ideas ◦ Details present but not precise ◦ Shows some specifics 	<ul style="list-style-type: none"> ◦ Topic fairly narrowed ◦ New ways of thinking about topic attempted ◦ Credible details with some support ◦ Writer understands topic 	<ul style="list-style-type: none"> ◦ Narrow and manageable topic ◦ Clear and focused; answers readers' questions ◦ Relevant, accurate details enrich theme ◦ Shows insight into topic 	<ul style="list-style-type: none"> ◦ Unique treatment of topic ◦ In-depth understanding of topic ◦ Unusual details go beyond the obvious ◦ Makes connections; shares insights effectively
Organization the internal structure of the piece	<ul style="list-style-type: none"> ◦ No lead or conclusion ◦ Sequencing not present ◦ No awareness of pacing ◦ Hard to follow 	<ul style="list-style-type: none"> ◦ Ineffective lead and conclusion ◦ Some sequencing apparent ◦ Pacing awkward ◦ Some attempt at structure 	<ul style="list-style-type: none"> ◦ Routine lead and conclusion ◦ More logical sequencing ◦ Pacing generally under control ◦ Common structures detract from content 	<ul style="list-style-type: none"> ◦ Effective lead and conclusion ◦ Sequencing works well ◦ Well-controlled pacing ◦ Common structures have smooth flow 	<ul style="list-style-type: none"> ◦ Inviting introduction and satisfying conclusion ◦ Effective sequencing ◦ Pacing is creative ◦ Structure begins to reveal theme 	<ul style="list-style-type: none"> ◦ Introduction and conclusion unique but connected ◦ Masterful sequencing ◦ Artful pacing used for stylistic effect ◦ Structure showcases central ideas or theme
Voice the way the writer brings the topic to life	<ul style="list-style-type: none"> ◦ No concern for audience ◦ Lifeless and mechanical ◦ Flat or inappropriate ◦ Purpose not present 	<ul style="list-style-type: none"> ◦ Occasionally aware of audience ◦ General statements require reader interpretation ◦ Tries to engage ◦ Hints at purpose 	<ul style="list-style-type: none"> ◦ Writer begins to connect with the reader ◦ Pleasing, yet "safe" ◦ Writer/reader connection fades in and out ◦ Purpose inconsistent 	<ul style="list-style-type: none"> ◦ Writer occasionally intrigues the reader ◦ Pleasing; takes risks ◦ Engages reader most of the time ◦ Purpose consistent 	<ul style="list-style-type: none"> ◦ Interesting and informative ◦ Takes effective risks ◦ Reflects interest and commitment in topic ◦ Purpose shows clarity and understanding 	<ul style="list-style-type: none"> ◦ Compelling and engaging ◦ Writer goes out on a limb ◦ Displays ownership of the topic ◦ Powerful purpose shows commitment
Word Choice the specific vocabulary the writer uses to convey meaning	<ul style="list-style-type: none"> ◦ Vocabulary is limited ◦ Simple words used incorrectly ◦ No figurative language ◦ Words do not convey meaning 	<ul style="list-style-type: none"> ◦ Generally correct words; no spice ◦ Language is functional ◦ Attempts at interesting words ◦ Words convey general meaning 	<ul style="list-style-type: none"> ◦ Some active verbs and precise nouns ◦ A moment or two of sparkle ◦ Experiments with figurative language ◦ Words begin to enhance meaning 	<ul style="list-style-type: none"> ◦ Effective and creative verbs and nouns ◦ Wording mostly correct ◦ Accurate use of figurative language ◦ Words and phrases work well 	<ul style="list-style-type: none"> ◦ Precision with words and phrases ◦ Wording works effectively ◦ Figurative language is effective ◦ Words and phrases create picture 	<ul style="list-style-type: none"> ◦ Powerful, engaging, and "just-right" words ◦ Wording is accurate and precise ◦ Artful use of figurative language ◦ Words and phrases create lingering images
Sentence Fluency the way the words and phrases flow throughout the text	<ul style="list-style-type: none"> ◦ Choppy, rambling, or incomplete ◦ No "sentence sense" ◦ Oral reading is not possible ◦ Repetitive beginnings 	<ul style="list-style-type: none"> ◦ Some simple sentences ◦ Occasional connecting word use ◦ Oral reading difficult ◦ Attempts variation in sentence beginnings 	<ul style="list-style-type: none"> ◦ Attempts compound and complex sentences ◦ Sentences usually connected ◦ Parts invite oral reading ◦ Sentences begin in different ways 	<ul style="list-style-type: none"> ◦ Begins to have easy flow and rhythm ◦ Strong and varied structure ◦ Oral reading encourages expression in places ◦ Sentences well crafted 	<ul style="list-style-type: none"> ◦ Rhythm and flow feel natural ◦ Creative use of sentence length and structure ◦ Invites expressive reading ◦ Sentences relate and build upon one another 	<ul style="list-style-type: none"> ◦ Carefully honed cadences ◦ Exquisitely constructed sentences ◦ Reading aloud is a breeze ◦ Sentences enhance meaning
Conventions the mechanical correctness of the piece	<ul style="list-style-type: none"> ◦ Spelling errors impede readability ◦ Incorrect punctuation and capitalization ◦ Many usage and grammar errors ◦ Lack of paragraphing 	<ul style="list-style-type: none"> ◦ Spelling errors even on easy words ◦ Errors on basic punctuation and capitalization ◦ Some usage and grammar errors ◦ Occasional use of paragraphing 	<ul style="list-style-type: none"> ◦ Spelling generally correct on basic words ◦ Routine punctuation and capitalization ◦ Grammar errors infrequent ◦ Consistent paragraphing 	<ul style="list-style-type: none"> ◦ Few spelling errors even on more difficult words ◦ Consistent use of punctuation and capitalization ◦ Grammar and usage correct ◦ Correct use of paragraphing 	<ul style="list-style-type: none"> ◦ Spelling correct even on more difficult words ◦ Accurate use of punctuation and capitalization ◦ Standard grammar and usage are under control ◦ Sound and creative paragraphing 	<ul style="list-style-type: none"> ◦ Uses unique spellings for style ◦ Stylistic use of punctuation/capitalization ◦ Grammar and usage contribute to clarity and style ◦ Paragraphing is stylistically effective
Presentation the overall appearance of the work	<ul style="list-style-type: none"> ◦ Handwriting unreadable ◦ Random spacing or lack of spacing ◦ Poor use of white space ◦ Overall appearance unacceptable 	<ul style="list-style-type: none"> ◦ Handwriting poor ◦ Some thought given to spacing ◦ Attempts at margins and headers ◦ Overall appearance distracting 	<ul style="list-style-type: none"> ◦ Handwriting mostly readable but inconsistent ◦ Attempts consistent spacing ◦ Margins and headers effective ◦ Overall appearance is acceptable 	<ul style="list-style-type: none"> ◦ Legible handwriting ◦ Spacing improves clarity ◦ Experiments with graphic elements ◦ Overall appearance shows balance and proportion 	<ul style="list-style-type: none"> ◦ Handwriting is consistent ◦ Good balance of space and text ◦ Effectively integrates graphic elements ◦ Overall appearance makes it easy to read 	<ul style="list-style-type: none"> ◦ Handwriting shows uniform slant, spacing, and letter formation ◦ White space and text work in harmony ◦ Graphic elements and text are synchronized and aligned ◦ Overall appearance is pleasing

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