CHAPTER 9

Are Students Really Reading in Independent Reading Contexts? An Examination of Comprehension-Based Silent Reading Rate

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After a recent presentation by one of the authors (Kathleen), a teacher asked, "My students act like they are reading when reading silently, but how do I know if they are really reading?" This teacher's question reflects a concern of many teachers. Recently, however, teachers have not been the only ones asking questions about the efficacy of silent reading. As a result of the conclusions of the National Reading Panel (NRP; National Institute of Child Health and Human Development, 2000) that sustained silent reading has not proven particularly effective in increasing fluency and comprehension, policymakers and administrators have raised questions about the effectiveness of silent reading during instructional time. The NRP's conclusions regarding the efficacy of oral, guided repeated reading have meant an emphasis on oral reading experiences in the primary grades as evident in classroom observations (Brenner, Hiebert, & Tompkins, 2009) and in textbook programs (Brenner & Hiebert, 2010). At the same time, the Panel's conclusions regarding the lack of substantive empirical literature that confirms the efficacy of independent, silent reading experiences on comprehension have meant, at least in the primary grades, a deemphasis on silent reading (Brenner et al., 2009).

Ultimately, however, most of the reading that adults, adolescents, and even middle- and upper elementary–grade students do is silent. Unarguably, the ability to read extended texts on one's own (i.e., silently) with comprehension is the foundation of proficient reading. The products and processes of comprehension are frequently the focus of researchers and educators. However, one dimension that is

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infrequently addressed is the rates at which students are reading with meaning. The topic of rate of silent reading has often been equated with speed reading. We are not suggesting a return to the speed-reading craze of the 1960s, nor are we advocating the obsession with speed that has become the interpretation of oral reading fluency during the last decade.

There can be little doubt that demands for efficient and effective silent reading have increased as the amount of information available to citizens of the digital–global age increases. The form of reading in which we are interested has comprehension at its center. Within a focus on comprehension, we believe that there is room for attention to the rates at which students are reading, particularly whether students are reading at appropriate rates. The digital revolution has meant that there are potential ways to address these reading rates and for determining whether they are appropriate for the tasks confronting students. We have termed the construct in which we are interested as comprehension-based silent reading rate (CBSRR).

Teachers in our graduate courses and workshops have asked numerous questions about CBSRR, such as the one that introduces our chapter. We delved into the research literature to answer these questions as well as our own questions. Our search for answers, however, produced few definitive responses. With only a few exceptions (e.g., Carver, 1990, 1992), researchers have not addressed CBSRR over the past decades. While the lack of a robust research surprised us, it also served as an impetus. We initiated a study that considered several persistent questions about CBSRR. We could not address all of the critical questions in a single study, so we raise some of our many remaining questions at the end of the chapter. We were able, however, to provide preliminary answers to some critical questions about CBSRR in the study we describe here.

This chapter provides a summary of responses to the three foci of our study: (1) How do students of different quartiles vary in their CBSRR? (2) How well do students sustain their CBSRR across an extended text? (3) How consistent is the CBSRR of students in a digital context relative to a paper-and-pencil context? Before describing the design and findings of this study, we provide an overview of what is and is not known about CBSRR and our three foci.

A Review of CBSRR

The term *comprehension-based* is central to our definition of CBSRR. The digital age has made an abundance of information available to human beings, unlike any volume experienced by previous generations. While offering unique opportunities for learning and communication, this surfeit of information places demands on readers for higher level comprehension processes more than those demands of previous eras. Full participation in the digital–global marketplace and community demands deep and broad background knowledge and comprehension skills that are finely honed to evaluate and integrate information. A fast reading rate without higher order comprehension skills falls far short of the literacy standards needed for full participation.

The term *silent reading rate* is also a critical consideration in developing readers who can participate fully in the tasks of the digital–global age. Readers who stop and tediously sound out numerous words in texts are unlikely to have the cognitive resources to employ higher level comprehension processes. They are also individuals who will likely not have the stamina to read and integrate information from several sources or read extended texts.

Literacy researchers have shown an interest in two of the words within these terms—*comprehension* and *rate*. There has been substantial research on comprehension and comprehension processes (e.g., Duke & Pearson, 2002) and considerable work on rate. Almost all of this work, however, has been done on oral reading rate (e.g., Fuchs, Fuchs, Hosp, & Jenkins, 2001; Kame'enui & Simmons, 2001). Rarely, however, have the two constructs been examined in the same study. In particular, attention on the rates at which students are reading with meaningful comprehension has been scant.

When the topic of silent reading rates is raised among literacy researchers, the general response is one of skepticism (e.g., Brozo & Johns, 1986) or disinterest (see, e.g., Cassidy & Cassidy, 2009). In our case, especially for the two of us who have been teachers or teacher educators in U.S. contexts since the early 1970s, we know that this describes our perspective. As teachers and graduate students, we watched with skepticism the claims of and the techniques on speed reading (e.g., Frank, 1992). Continued spurious claims of speed-reading programs, such as that of reading 25,000 words a minute, have only reinforced a sense of skepticism for a new generation of researchers. As a result, the study of rate, with respect to silent reading at least, has not been a popular topic for research.

Although there are several sets of oral reading norms (e.g., AIMSweb, 2008; Good & Kaminski, 1996; Hasbrouck & Tindal, 2006), there is a single set of silent reading norms that are based on data gathered in the late 1950s and reported in 1960 (Taylor, Frankenpohl, & Pettee, 1960). These silent reading norms are presented in Table 9.1. This set, although based on a large sample, is for the 50th percentile. How the 25th or 75th percentile groups do in comparison is uncertain. Such generic norms stand in contrast to the oral reading norms like those of Hasbrouck and Tindal (2006) that are also included in Table 9.1. As is the case with the various oral reading norms that have proliferated over the past 20 years in the wake of the advent of curriculum-based measurement (CBM; Deno, 1985), these oral reading norms are not based on assessments that include comprehension. Although dated and not as detailed as the Hasbrouck and Tindal (2006) oral reading norms, the silent reading norms (Taylor et al., 1960) are based on comprehension. This distinction is an important one, and it served as a primary incentive for our interest in CBSRR rather than simply on silent reading rate.

How Do Students of Different Quartiles Vary in Their CBSRR?

Although the Taylor et al. (1960) comprehension-based silent reading norms do not give an indication of the variation across a cohort of students, all available

Table 9.1. Silent Reading and Oral Reading Rates

	Percentile	Grade												
		1	2	3	4	5	6	7	8	9	10	11	12	College
Silent reading rates (Taylor et al. (1960)	50th	80	115	138	158	173	185	195	204	214	224	237	250	280
Oral reading rates (Hasbrouck & Tindal, 2006)	25th	23	65	87	92	100	122	123	124	NA				
	50th	54	94	114	118	128	150	150	151	NA				
	75th	82	117	137	153	168	177	177	177	NA				

evidence leads to the expectation that differences across students within a cohort would be great. On the National Assessment of Educational Progress (NAEP; Lee, Grigg, & Donahue, 2007), the differences within a cohort of students in their comprehension performances on a silent reading test are substantial.

There is evidence that rate figures into these performance differences on the NAEP silent reading assessments, insofar as the evidence comes from oral reading assessments. In a special study associated with the NAEP, researchers had a representative sample of students read orally the texts on which their silent reading comprehension had been assessed (Pinnell et al., 1995). Oral reading rate correlated moderately well with comprehension. Differences in students' word recognition accuracy were not statistically significant. Differences in students' oral reading rates were substantially different, with students who comprehended less well having much slower oral reading rates than students whose comprehension was higher. Similar patterns were found in a recent replication of the Pinnell et al. study (Daane, Campbell, Grigg, Goodman, & Oranje, 2005).

Table 9.1 includes the rate of growth that occurs in words per minute (wpm) in oral reading for students at three percentile levels across first through eighth grades, according to the Hasbrouck and Tindal (2006) norms. What is remarkable is the degree of consistency across the percentile groups once students move beyond first grade. They start at different points in first grade, but their growth occurs at the same pace after this point. Once students get to the middle grades, they level off. This rate of oral reading—150 wpm—is the same as the typical speech production rate of adults in the United States (Schmidt & Flege, 1995). The students in the 75th percentile have attained a level slightly higher than this rate, but the 50th percentile is on target in terms of speech production speed. The 25th percentile, at least through eighth grade, performs approximately 25 words slower than the average speech production rate.

In considering the potential patterns of CBSRR for readers at different levels, it is critical to recognize the differences between oral and silent reading. Oral

reading is a performance-based situation. If a word is unknown, students cannot gloss over it in the manner that is possible in silent reading. Further, oral reading speed is governed by the speed with which individuals talk. Humans can speak faster than 150 wpm, and students can likewise read faster orally, especially if there is no concern with prosody or comprehension. These higher than expected rates may be the case as a result of the assessment expectations and practices of the past decade. Typically, as the norms in Table 9.1 indicate, proficient oral reading keeps pace with the rate at which human beings speak.

The oral production factor and the need to produce each word when reading orally, especially to a teacher or evaluator, leads to the suggestion that there may be more similarities among individuals in oral reading than in silent reading. Silent reading contexts, however, also have constraints. There are limits to what the brain can do (Cunningham, Stanovich, & Wilson, 1990) and what the eye can do (see Chapter 2, this volume). Claims that someone can take a mental photograph of a page of text at 25,000 words a minute do not require extensive investigation to be deemed as spurious (McNamara, 2000).

What is clear from the data in Table 9.1 is that, not long into the reading acquisition process, silent reading rates surpass oral reading rates. The comparison of students at the 50th percentile in oral and silent reading attest to this conclusion, even at first grade. By fourth grade, silent reading for 50th percentile students is approximately one third faster than it is for oral reading. Further, once oral reading rates stabilize (reflecting the oral production factor) at the end of elementary/middle school, silent reading rates continue to increase. By the time they are in college, readers at the 50th percentile read silently at almost twice the rate that they read orally.

With a greater range in reading rates, as is the case with silent reading, there may be greater variability among students of different proficiency levels. One factor that has sometimes created problems in the measurement of silent reading is the tendency for struggling readers to inflate their self-reports of reading rates (Fuchs et al., 2001). By making comprehension performances the ultimate criterion for determining appropriate rates, we are eliminating the potential of "fake" reading (Griffith & Rasinski, 2004).

How Well Do Students Sustain Their CBSRR Across an Extended Text?

We are especially interested in a construct called "reading stamina"—the ability to sustain attention and proficiency across a text. Even though educators refer to stamina as a critical aspect of reading (e.g., Johnson, Freedman, & Thomas, 2008; Qualifications and Curriculum Authority, 2005), it is rarely addressed directly in research. For example, in reviewing the three volumes of the *Handbook of Reading Research*, we found no references to or descriptions of stamina. Despite this lack of attention, a strong case can be made for hypothesizing that stamina could be an issue in both oral and silent reading. Students, particularly those

in the bottom quartile, may quickly become fatigued when asked to read longer texts. Conversely, it could be argued that once students become familiar with the content and the vocabulary of an extended text, their reading rates would increase. Texts are frequently written so that the principal ideas—and the vocabulary that represents those ideas—are presented early in a text. Once students have been introduced to a text's vocabulary and principal ideas, their reading rates might increase as they move through the remainder of the text.

Another perspective is that stamina would be challenged most directly in silent reading. Silent reading involves managing one's strategies and comprehension. A strategy that illustrates such comprehension management is clarifying confusing parts of text, one of a handful of strategies that has been found to distinguish proficient and challenged readers (Brown & Smiley, 1978). Thus, slow silent reading may be an indication of comprehension monitoring. Evidence for this hypothesis is limited. There is a need to find out more about silent reading rates, especially those of students in different proficiency groups. Rather than glossing over silent reading, interventions may need to focus directly on the nature of dysfluent silent reading patterns of low-performing students.

Stamina may be a particularly critical construct to consider in relation to the "iGeneration" (Rosen, 2010). For these students, whose lives have involved a barrage of information presented in several modalities simultaneously, attending to the fine print in rather solitary situations may be challenging. These students may have high levels of word recognition and may be facile with a variety of background knowledge. What may be challenging for them is sustained involvement with a text. The average length of a text on the fourth-grade NAEP is 800 words (Lee et al., 2007), while the average length of texts in the fourth-grade anthology of a widely used core reading program is approximately 2,000 words (Afflerbach et al., 2007).

A particular shortcoming of assessments that have typified the CBM movement, whether the mode is oral or silent reading, is the brevity of assessments—one minute or two minutes at most. The oral reading norms summarized in Table 9.1 reflect the shorter tasks. The silent reading norms, by contrast, reflect substantially longer tasks.

How Consistent Is the CBSRR of Students in a Digital Context Relative to a Paper-and-Pencil Context?

Teachers' interest in answers to this question derive from the recognition that reading in digital contexts is central to success in the digital–global age. Reading in digital contexts involves a myriad of issues that are not present in paper-and-pencil contexts (see Chapter 13, this volume). Even elementary students need to make numerous choices as they negotiate online reading tasks. In the face of a paucity of information on students' comprehension and rate of reading, our interest was straightforward: We wanted to know if students were able to read with

similar levels of comprehension and at similar rates when they were reading texts presented digitally and in conventional contexts with printed texts.

Students' ability to transfer their reading skills to a new and critical context was one reason for including this component in our study. As researchers, we had a second reason. If teachers are going to support students' stamina and capture whether students are improving in their CBSRR, they need ways to gather information on students' CBSRR regularly and with *authentic* data. At the present, the typical form of assessment that is used for capturing CBSRR is the maze technique (Deno, 2003). The maze technique emanates from the CBM perspective that also spawned the widely used one-minute oral reading assessments (e.g., Good & Kaminski, 1996). A maze assessment for the primary grades consists of a passage slightly longer than what is anticipated would be read by the fastest grade-level readers (e.g., 300 words for second grade). Every seventh word (although the number can be varied) is replaced with a blank, and three or four words are listed underneath. The choices include the correct word as well as words that vary in their semantic, syntactic, or graphophonemic similarity to the target word. Students mark their choices. Their CBSRR is based on the number of words represented by their correct choices. As with oral reading fluency assessment, the typical length of time is one minute.

Studies have been conducted on the reliability of the maze relative to other assessments and have shown that the maze is positively related to performances on standardized tests (Shin, Deno, & Espin, 2000). Questions of validity have persisted around the maze, such as the effects of needing to stop and mark choices (Guthrie, Siefert, Burnham, & Caplan, 1974; Parker, Hasbrouck, & Tindal, 1992). Maze developers have identified particular rules for guessing, but the technique's success depends on carefully crafted alternatives for the target words.

The crafting of questions is a challenge for any assessment, but we are interested in the use of comprehension texts and questions that are typical of those used in classroom experiences, including typical tests. The tests that currently form such a central part of the classroom lives of students and teachers often contain highly crafted questions. Unfortunately, information from such tests is reported as summary scores, usually in the form of norms. If data on CBSRR are to be brought to bear on instruction, teachers and students require information about specific texts and questions. They also require this information quickly to make informed instructional decisions—in hours rather than in the weeks or even months it can take to get back test results.

Because recent advances in digital environments have been notable (PytlikZillig, Bodvarsson, & Bruning, 2005), we believe that new technologies offer a viable approach to the problem of assessing CBSRR. In particular, the interactivity of the computer "page" could permit educators to measure students' CBSRR reliably, frequently, and with authentic texts and tasks. A question that remained unanswered was whether students would perform with similar rates and comprehension when reading text on a computer screen and in the more typical school contexts of a printed text.

Designing and Implementing a Project to Answer Questions About CBSRR

In the study that we designed to address our questions about CBSRR, we had students representing a range of reading proficiencies read silently sections of an extended text in two different reading contexts. Our interest lay in similarities or differences in the performances of students of different quartile groups, at different points in reading an extended text, and between two contexts (digital and paper and pencil).

Method

Eighty-three students from five fourth-grade classrooms in a Midwestern, urban school district participated in the study. The participants were 65% Caucasian, 13% African American, 12% Asian American, and 9% Hispanic. More than 60% of the students in the schools receive free- or reduced-cost lunch. Participants included 15% English Learners and 13% special education students (i.e., those with speech-language disorders or specific learning disabilities).

We wrote two comparable sets of informational texts, each containing 1,000 words. Each set consisted of five texts connected by a common theme. The content of both themes came from a similar domain—communication. The underlying theme of one set of texts had to do with the role of posters in the past and present (e.g., posters as a source of information and announcements before the printing press). The theme of the second set was on nonverbal language (e.g., military hand signals, Braille).

Texts were created over numerous iterations to ensure that the two sets were as comparable as possible on several measures. The first was sentence length. As the readability levels for the Flesch-Kincaid and Fry indicate in Table 9.2, texts were comparable on that dimension. A second consideration in the creation of the texts was the comparability of vocabulary. Data on the distribution of words in word zones established by frequency of appearance in written English (Hiebert, 2005) indicate that the distribution of words that were highly frequent (i.e., Word Zones 0–2), moderately frequent (Word Zones 3–4), and rare (Word Zones 5–6) was comparable across the two sets of texts.

The readability levels on both the Flesch-Kincaid and Fry suggest that the texts were approximately 1.5–2.5 grade levels above the mid-fourth-grade (the grade-level placement of students in the study). This difficulty level, however, is an artifact of a feature of readability formulas that has long been recognized as inflating the difficulty of informational texts (Cohen & Steinberg, 1983). This feature is that each appearance of a word counts in the establishment of readability with formulas such as the Flesch-Kincaid or Fry. In informational texts, rare (and often multisyllabic words) are repeated frequently when they are central to the content. Thus, informational texts typically are assigned high readability levels.

Table 9.2. Features of Texts Used in Study

Feature	Text A (Posters)	Text B (Nonverbal Language)
Number of words	1,000	1,000
Flesch-Kincaid readability	6.1	5.9
Fry readability	7	7
Unique words:		
Word Zones 0–2	85%	83%
Word Zones 3–4	13%	16%
Word Zones 5–6	1.5%	1%
Type-token ratio	.28	.28

The texts in this study had been written to be representative of informational texts and to comply with components of the TExT model (Hiebert, 2002) in which cognitive load (i.e., the ratio of unique words to total words or type-token ratio) and the percentage of rare words (i.e., Word Zones 5–6) are seen to influence text difficulty. The texts, as can be seen in Table 9.2, had type-token ratios of 0.28. A typical assessment text, such as those on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 1996) has a type-token ratio of 0.50 or higher (Hiebert, Stewart, & Uzicanin, 2010). Further, the percentages of rare words were low (1–1.5%) and the percentages of words in the 1,000 most frequent words (i.e., Word Zones 0–2) of 83–85% were high, leading to the expectation that most fourth graders should be able to read the majority of words.

To accompany the two text sets, we created two short sample passages of 200 words, each on familiar informational subjects: U.S. parks and dinosaurs. Each sample passage had two multiple-choice comprehension questions. As with the main text sets, the vocabulary in the sample passages was controlled. The purpose of the sample passages was to familiarize the participants with the assessment's format.

Each passage within a theme was immediately followed by four comprehension questions specific to the passage that students needed to answer before continuing to the next passage. Each set of passages, therefore, included 20 questions. Each set of questions for a passage included two literal questions, one inferential, and one interpretive.

We conducted a pilot study to ensure the validity and reliability of the comprehension questions and to ensure that the special Internet-based application that had been created for the computer condition of the study was student friendly. The pilot study sample consisted of two fourth-grade classes with demographics similar to those in the main study. One class of students (n = 19) was administered the full texts with comprehension questions in the computer context. A second class (n = 21) responded to the questions about the texts without exposure to the

texts. The data from the pilot study was used to refine both the computer program and the comprehension questions. For example, questions that students in the latter group could answer with high levels of success were eliminated from the final test set.

Students were assessed in spring of fourth grade. Computer administration was conducted in the school's computer lab with two observers who read directions, assisted with technical problems, and redirected students. The individualized paper-and-pencil administration followed the same format and organization but added a third observer who aided in recording students' start and stop times for text sections.

Texts were counterbalanced for order of administration (i.e., computer vs. paper-and-pencil) and topic (i.e., nonverbal language vs. posters). Comprehension scores were corrected for guessing. Reliability of the 20-item comprehension items for each set of passages was established using coefficient α. The reliability for both scales was 0.74, an acceptable range for research measures.

Results

Outlier analysis showed that there was a group of students with extremely high reading rates and very low comprehension performances. The performances of the outlier students can be seen in Figure 9.1. The observers who had been present during the task administration to ensure students' ease with the computer interface confirmed that particular students appeared to move rapidly through the task. As a result of this analysis, the data used in the subsequent analyses was limited to 65 students.

Descriptive statistics that appear in Table 9.3 indicate that silent reading rates were precisely the same on the two different sets of passages. This silent reading rate of approximately 154 wpm is similar to the average of 158 wpm reported by Taylor et al. (1960) for fourth graders almost 50 years ago. Comprehension performances were slightly lower on the posters text than that on nonverbal language.

A repeated-measures ANOVA was used to compare performances in the paper-and-pencil and computer administrations. For reading comprehension, there were no significant differences: $F(1, 77) = 1.19$, $p = 0.28$ $MSE = 6.32$. For silent reading rate, there was a significant effect for mode of presentation $F(1, 61) = 5.43$, $p = 0.02$ $MSE = 873$. This difference was not massive, but the context in which the slightly faster rate occurred is of interest—the computer context as is evident in Figure 9.1. Further, the lack of significant differences in comprehension indicates that this somewhat higher rate did not compromise comprehension.

The next set of analyses considered differences across quartile groups. Quartile groups were established on the basis of comprehension scores. Repeated-measures ANOVA revealed that rates for different comprehension quartiles were significantly different overall $F(3, 72) = 2.7$, $p = 0.05$ $MSE = 210035$.

The interpretation of rates by different groups is difficult because of different patterns of performance by the quartile groups on different parts of the texts. These

Figure 9.1. Average Reading Rate by Group and Context

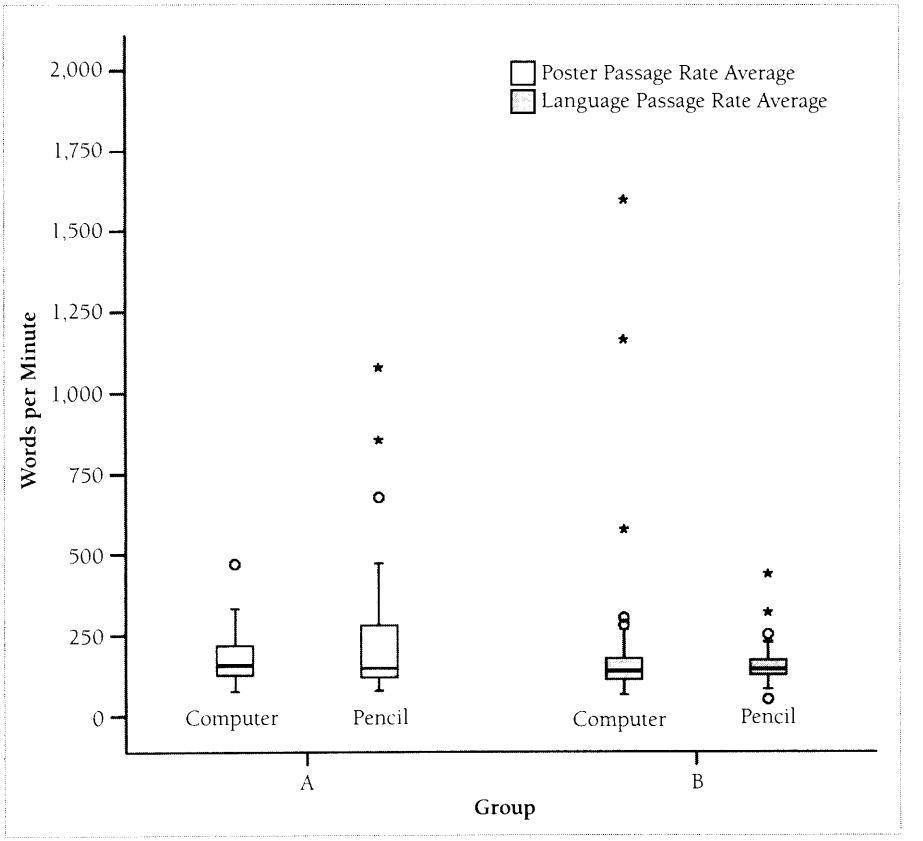
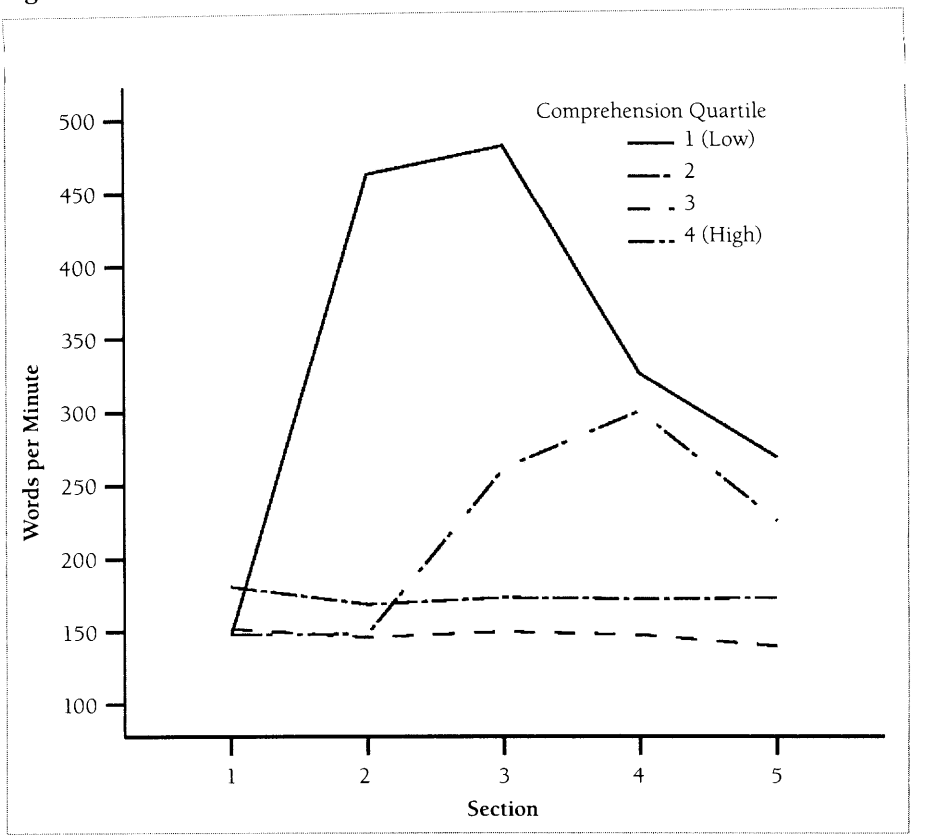


Table 9.3. Descriptive Statistics for Comprehension and Silent Reading Rate for Texts

	Mean	*SD*
Corrected comprehension score Text A (posters)	6.3	4.1
Corrected comprehension score Text B (nonverbal language)	7.9	3.7
Silent reading rate Text A	153.5	63
Silent reading rate Text B	153.5	60

patterns are provided for the first text (Posters) in Figure 9.2. For the first section of the assessment, the highest quartile performed approximately 30 wpm faster than the other three quartiles. The rates of Quartiles 1 and 2 were slightly lower than those of Quartile 3 but not substantially so on the first section of the text.

Figure 9.2. Silent Reading Rate for Text A (Posters) by Section



A repeated-measures ANOVA verified the pattern that can be seen in Figure 9.2 of performances of different quartile groups across sections of the text. Although students in the two lower quartiles started out at a reasonable rate, their rates changed dramatically over the sections of the assessment (but not with increases in comprehension). The effect was nonlinear. The lowest quartile readers increased their speed after one passage (but without commensurate gains in comprehension). The second-lowest quartile increased their speed after two sections (again, without commensurate gains in comprehension). The students in the top two quartiles had stable rates that changed very little across sections of the text. Further, their comprehension remained stable.

Some Conclusions About Silent Reading

Silent reading has been an area in which educational practices have swung from one extreme to another (see Chapter 1, this volume). At particular times, all reading—even for first graders—was mandated or advocated to be silent. The

opposite swing of the pendulum has been evident in the past decade, when oral reading has been emphasized as the primary mode. When one solution is found wanting, it is replaced by another solution. In a domain as complex as reading, single solutions will always be found wanting. A single study on CBSRR cannot produce all of the answers to a very complex set of issues. We can, however, give some tentative answers to a critical set of questions. These answers are offered in the spirit of continuing investigation, both by researchers and teachers, of what works best with particular kinds of texts and at particular points in development.

We begin by answering the question that we raised in the title of this chapter—are students really reading in independent reading contexts? The answer: Yes, most students are. Many students read at fairly consistent rates across different sections of a text. They comprehend at a fairly consistent level as well. Their rate is somewhat faster when they are reading digital text rather than a paper text, but with similar levels of comprehension.

This pattern—where most students are reading consistently in different silent reading contexts—is an important one to consider when thinking about the design of instruction. We are in the midst of the greatest knowledge revolution in human history. In a world where knowledge is the critical commodity, reading is a primary means whereby knowledge is acquired. We are not suggesting by any stretch of the imagination that all reading should be silent reading (see the Conclusion for an expansion on the functions of oral and silent reading). Oral reading serves several essential roles, particularly at critical periods in students' reading acquisition. By the same token, to limit silent reading opportunities of all students because a portion of a cohort struggles with the task does a great disservice to all students. For struggling readers, such prohibitions mean that there is no opportunity to develop capacity in silent reading. For proficient readers, opportunities to learn are constrained when silent reading is limited.

Consider the greater amount of new vocabulary that students can acquire through silent rather than oral reading. If fourth graders read orally for 30 minutes daily at a speed of 118 wpm, they will read approximately 3,540 words daily or 637,200 words over a school year of 180 days. If they spend the same length of time reading silently, they will read 4,590 words daily or 826,200 words over the school year—approximately 189,000 more words. Based on existing research, it is estimated that 2–5% of these words will be unknown to students (Stahl, 1999) and, of these unknown words, students can be expected to remember approximately 5–10% from a single reading (Nagy, Anderson, & Herman, 1987). Using estimates of 3.75% unknown words and 7.5% remembered words, students will learn approximately 532 additional words in silent reading contexts. In that it is estimated that fourth graders acquire approximately 2,000 new words a year (Graves, 2006), this amount is significant. Further, because a primary way in which oral reading occurs is through round robin reading (Brenner et al., 2009), it is not at all clear that students will be attending to the texts to the same degree during oral reading as in silent reading.

But not all students' performances are consistent and reliable in silent reading contexts. Approximately 20% of the students did not stay "on the page." Another

group of students read the first one or two texts conscientiously but changed their strategy at that point, moving quickly to answer the comprehension questions without careful reading of the text. Considerable attention is required on the kind of experiences that underlie consistency in silent reading, particularly the stamina that is required to sustain interest and monitor comprehension through extended texts. We hypothesize that stamina is part of the cycle of poor reading that Stanovich (1986) describes. As poor readers read less, their skills become increasingly inadequate for new developmental tasks such as reading chapter-long texts. Even if the texts are not overly difficult (which was the case with the texts in the present study), poor readers approach reading tasks with low levels of motivation and interest. As Swan, Coddington, and Guthrie (see Chapter 6, this volume) describe, these students have poor identities of themselves as readers and low levels of intrinsic motivation.

Effective silent reading habits are not automatic outcomes of proficient word recognition and oral reading fluency. There are aspects of silent reading that make it unique from oral reading: vocalization, the need for self-monitoring, stamina, and interest. Numerous chapters in this volume highlight the components of instruction that support these components of effective silent reading. We will not review all of these components, but we do underscore one point: Just as the development of poor reading habits occurs over an extended period of time, so too development of good reading habits likely reflects many experiences over an extended period of time.

For the students who engage in what Griffith and Rasinski (2004) have described as "fake reading" behaviors, efforts to develop proficiencies such as self-monitoring, stamina, and interest are interwoven with the need to develop students' identities as readers and their intrinsic motivation. Most students have acquired fundamental word recognition by the end of second grade (Hiebert et al., 2010) and definitely by the middle of fourth grade (Pinnell et al., 1995). For a significant portion of these students (approximately a third of a grade cohort), this recognition is tedious and time consuming. They have not developed perseverance or stamina for the task. They need considerable support if they are to sustain attention to the texts and tasks of daily classroom life.

There are likely limits to what teachers can do—especially in classrooms where large groups of students have such behaviors. Hiebert, Menon, Martin, and Bach (2009), in considering the research on silent reading, suggest that digital contexts may be one means whereby support can be provided for struggling readers. In a computer context, the text can be fine tuned. The length of time can be monitored. Content can be chunked and periodic check-ins can be made. The architecture can be designed so that the length of time, the accessibility of text, and the tasks can be carefully adjusted to students' growing capacity as readers. Not much data have been gathered on current efforts, especially for struggling readers, but there is suggestive evidence that digital technology may provide the scaffolding that supports struggling readers in becoming stronger readers (Moran, Ferdig, Pearson, Wardrop, & Blomeyer, 2008).

At least in terms of our interest in providing classroom teachers with authentic and reliable assessments, the findings of this study leave us optimistic that digital contexts can serve as a means for providing teachers and students with consistent and usable information. Students responded well to the digital context with overall reading rates higher in that context than in the paper-and-pencil context. What we found to be particularly encouraging about this result is that students' faster rates did not compromise comprehension. This finding of students' somewhat superior performances in the digital context also bodes well for their flexibility as readers and their adaptation to a context that will be a critical one in their futures.

The study that we report in this chapter offers a window on variations of silent reading rate and comprehension of fourth-grade students when they are asked to read informational text. There are numerous questions that remain: How does this relationship change when similar assessments are administered to students in other elementary grades? Will the rates level off, as has been observed with oral reading fluency as the grades increase? Will reading rates change when comparing matched narrative and informational texts? When is it possible to gather reliable data based on students' developmental reading patterns? How should meaningful benchmark reading rates across the grades be created that are related to comprehension performance? Are students reading at appropriate rates? Are there optimal silent reading rates? Does oral reading practice improve CBSRR? Although this list of unanswered questions is sizable, it is not exhaustive. It illuminates the need for much more work in the area of silent reading assessment. Educators at all levels would benefit from a more nuanced understanding of the factors that affect students' learning when reading silently. Greater understanding of this little-studied reading mode will help to inform the instructional choices teachers make as students progress across the grades.

QUESTIONS FOR PROFESSIONAL DEVELOPMENT

1. Given the emphasis on the assessment of oral reading rates and practice of oral reading fluency in today's elementary classrooms as a result of the No Child Left Behind legislation, how might teachers better integrate a variety of reading contexts into the instructional experiences that they offer to students?
2. How might grade-level teams approach silent reading fluency and comprehension assessment in their classrooms? What might teachers in these teams gain from the data gathered from such assessments?
3. It is important to communicate that students need to work at comprehending what they read. How might this concept be incorporated in engaging *silent* and oral reading fluency assessment and instruction?

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