Journal of Educational Psychology
2008, Vol. 100, No. 2, 272–290

0022-0663/08/$12.00 DOI: 10.1037/0022-0663.100.2.272

Repeated Reading Intervention: Outcomes and Interactions With Readers' Skills and Classroom Instruction

Patricia F. Vadasy and Elizabeth A. Sanders
Washington Research Institute

This study examined effects of a repeated reading intervention, *Quick Reads*, with incidental word-level scaffolding instruction. Second- and third-grade students with passage-reading fluency performance between the 10th and 60th percentiles were randomly assigned to dyads, which were in turn randomly assigned to treatment (paired tutoring, $n = 82$) or control (no tutoring, $n = 80$) conditions. Paraeducators tutored dyads for 30 min per day, 4 days per week, for 15 weeks (November–March). At midintervention, most teachers with students in the study were formally observed during their literacy blocks. Multilevel modeling was used to test for direct treatment effects on pretest–posttest gains as well as to test for unique treatment effects after classroom oral text reading time, 2 pretests, and corresponding interactions were accounted for. Model results revealed both direct and unique treatment effects on gains in word reading and fluency. Moreover, complex interactions between group, oral text reading time, and pretests were also detected, suggesting that pretest skills should be taken into account when considering repeated reading instruction for 2nd and 3rd graders with low to average passage-reading fluency.

Keywords: multilevel modeling, fluency, repeated reading, verbal efficiency, paraeducators

Repeated reading is a widely used practice (Meyer & Felton, 1999; Samuels, 1979) to increase reading fluency (National Reading Panel, 2000); yet, despite its use and acceptance, it is not an entirely standardized procedure. For example, there is no consensus regarding how long and intense it must be to be effective (Chard, Vaughn, & Tyler, 2002), and most research on repeated reading has been conducted on relatively short interventions (Wolf & Katzir-Cohen, 2001). Repeated reading interventions may require students to reread the same texts or different texts, and again, it is not clear which of these methods is more beneficial (Kuhn & Stahl, 2003). When repeated reading is implemented, it may be assisted by an adult reader or teacher, and it is unclear whether the most effective method depends upon the student's skills and developmental needs (National Reading Panel, 2000). Finally, the type of text that is most beneficial to use in a repeated reading intervention is not well specified (Kuhn & Stahl, 2003). There are equivocal findings whether independent or instructional-level text is associated with greater fluency gains (Kuhn & Stahl, 2003). Less is understood about the role of text characteristics that, as Menon and Hiebert (2005) suggested, may mediate instructional and fluency gains. These text characteristics include total number of words, word repetitions, and word frequency (i.e., the likelihood that the words reread will be reencountered and reinforced in other grade-level texts or instructional content). The number of word repetitions or exposures during reading instruction may contribute to the growth of word recognition skills (Juel & Roper-Schneider, 1985).

Researchers' increased understanding of the subtypes of dysfluent students (Berninger, Abbott, Billingsley, & Nagy, 2001) and stages of fluency development raises questions about the grade levels and developmental stages when repeated reading may be most effective for fluency as well as comprehension. The importance of specifying treatment effects for particular stages of fluency development is underscored by the work of Schwanenflugel et al. (2006). In support of their simple reading fluency model they found that for children in Grades 1 to 3, a single reading fluency factor that included word reading accuracy and efficiency skills and object naming was related to comprehension. The National Reading Panel (2000) summarized limitations and directions for future research on fluency, including the need for explicit treatment descriptions of amount of rereading, type of feedback, and difficulty level of materials. The present study attempts to specify more fully the features of a supplemental fluency intervention for students with a range of emerging fluency performance. We also examine features of students' classroom instruction that may influence reading skill growth and interact with fluency treatment.

Fluent reading reflects the development and consolidation of subskills that permit the student to allocate attention to constructing a meaning of the text (LaBerge & Samuels, 1974). According to Perfetti's (1985, 1992; Perfetti & McCutchen, 1987) verbal efficiency theory, the efficiency of phonological, orthographic, and

Patricia F. Vadasy and Elizabeth A. Sanders, Washington Research Institute, Seattle, Washington.

Grant R305G040103A from the Institute of Education Sciences, U.S. Department of Education, supported this research. We especially acknowledge Sueanne Sluis for coordinating the intervention and the classroom observations. We also thank Sarah Tudor and Kathryn Compton for coordinating student assessments; and we thank coaches, testers, teacher observers, tutors, and data entry staff for their work on the project, including Sarah Barton, Katy Compton, Alison Fiorito, Christine Haas, Rayma Haas, Robin Horton, Gwenneth Kunde, Ruthanne McPhaden, Siobhain Mogensen, Devon Parris, Lindsay Schwartz, Laura Root, Tyler Rothnie, Laurel Rustmeyer, and Lynn Youngblood. Last but not least, we are most grateful to the teachers, staff, and children of the schools for their support and participation in this study.

Correspondence concerning this article should be addressed to Patricia F. Vadasy, Washington Research Institute, 150 Nickerson Street, Suite 305, Seattle, WA 98109. E-mail: pvadasy@wri-edu.org

semantic processes underlies word recognition and retrieval, and differences in these lexical retrieval processes influence comprehension. Slow and inefficient word identification creates a bottleneck that diverts cognitive resources required for comprehension. Verbal efficiency theory predicts that efficiency in word and text reading accuracy and speed will produce improved comprehension. The research on training in verbal efficiency, however, is mixed. Two types of training have been used to develop fluency: training to recognize single words and practice in reading connected text (repeated reading). Fleisher, Jenkins, and Pany (1979) trained students to read words in isolation and in word phrases, and although both types of training increased decoding accuracy and speed for single words, training did not improve comprehension. Others have also failed to show transfer to reading comprehension through training in single-word reading (Yuill & Oakhill, 1988). In a replication of the Fleisher et al. study, Tan and Nicholson (1997) used training in single-word reading to produce gains in comprehension. Others have reported training in single words or connected text generalized to comprehension (Levy, Abello, & Lysynchuk, 1997; O'Shea, Sindelar, & O'Shea, 1985; Samuels, Dahl, & Archwamety, 1974), with reports of mixed effects (Roth & Beck, 1987). Findings on verbal efficiency training are difficult to interpret due to differences in student age and developmental level, training focus, and comprehension tasks.

For practical purposes we define fluency as "rate and accuracy in oral reading" (Torgesen, Rashotte, & Alexander, 2001). However, our assessments reflect an emerging understanding of fluency that encompasses subcomponent skills and executive coordination processes (Berninger et al., 2001) as well as the developmental nature of fluency (Kame'enui, Simmons, Good, & Harn, 2001). Of particular interest in this study of second- and third-grade students was word reading efficiency or automaticity, which is also represented in Schwanenflugel et al.'s (2006) simple reading fluency model of emergent fluency development. Both the more classic and contemporary theories of fluency predict that word recognition and retrieval skills explain individual variance in children's fluency rates in reading connected text.

Several published reviews of fluency instruction have summarized the theory and nature of fluency interventions (Wolf & Katzir-Cohen, 2001), features and research on fluency practices (Kuhn & Stahl, 2003), and the findings on fluency interventions for children with learning disabilities (Chard et al., 2002). In their review of the history of fluency interventions and their components, Wolf and Katzir-Cohen described a theory-based, multicomponent fluency intervention based on information processing models (LaBerge & Samuels, 1974; Perfetti, 1985) that predict that fast acting subskills enable students to allocate sufficient attention to higher level text comprehension. Wolf and Katzir-Cohen described more recent research that captures both the developmental nature of fluency (Kame'enui et al., 2001) and multiple processing systems (phonological, orthographic, and morphological) that contribute to text-level reading fluency. This review highlighted several important limitations. First, most interventions were relatively short—between 1 and 15 days in length. More recent research has underscored the difficulty of remediating students with poor fluency (i.e., Torgesen et al., 2001) and the need for intensive intervention. Second, most of the studies in this review did not include a control group. Third, comprehension was assessed inconsistently. And fourth, studies did not examine lexical-level rate change that may be most directly influenced by repeated reading (Faulkner & Levy, 1999; Torgesen et al., 2001).

Kuhn and Stahl (2003) identified 15 studies of repeated reading that included a control group. They found that repeated reading intervention was more effective than the control condition in six studies and in one study only when familiar passages were used. Considering findings of effectiveness based on individual study comparisons (adding weight to studies with multiple comparisons), they found that repeated reading interventions were significantly more effective than control conditions in 8 comparisons and not more effective in 21 comparisons. Differences in types of control groups used in these studies (no treatment or nonrepeated reading control) made it difficult to draw firm conclusions across these studies. Kuhn and Stahl found some advantage for reading more difficult text and that comprehension gains were difficult to detect using standardized comprehension measures (rather than cloze tasks).

Finally, Chard et al. (2002) reviewed 24 studies of fluency interventions provided for elementary students with learning disabilities. They found that repeated reading with a model was most effective, particularly for students with low fluency. A teacher or adult model was more helpful than a tape or computer model. Fluency growth was associated with comprehension growth in many of the studies. Although findings did not suggest an optimal number of rereadings, the authors concluded that effective components of fluency intervention for students with learning disabilities include rereading difficult text with adult feedback and corrections. The study design we describe here addresses limitations in research designs found in these earlier reviews of fluency interventions, including lack of a control group, low intensity of treatment, and lack of standardized word reading efficiency and comprehension measures.

Intervention Research on Supplemental Instruction

Supplemental reading interventions play an important role in many children's reading instruction. They may be provided by teachers or by paraeducators, and in individual or small-group, pull-out sessions. A small number of these interventions, particularly early phonological awareness and phonics-based programs, have been evaluated in rigorous research designs (*Road to the Code*: Blachman, Ball, Black, & Tangel, 1994; Blachman, Tangel, Ball, Black, & McGraw, 1999; *Ladders to Literacy*: Fuchs et al., 2001, 2002; *Peer Assisted Learning Strategies*: Fuchs et al., 2001, 2002; *Spell Read P.A.T.*: Rashotte, MacPhee, & Torgesen, 2001). There is limited research on supplemental instruction using programs that focus on fluency skills (*Read Naturally*: Hasbrouck, Ihnot, & Rogers, 1999; *Great Leaps*: Mercer, Campbell, Miller, Mercer, & Lane, 2000). Because the fluency intervention in the present study was used to supplement classroom instruction and was implemented by paraeducator tutors, we consider features associated with effective supplemental tutoring interventions. Juel (1996) summarized reading activities significantly associated with literacy growth in tutoring programs, including direct letter–sound instruction and the introduction of high-frequency and pattern words. Wasik's (1998b) review of 17 studies of volunteer tutoring in reading skills identified four features common to programs: a designated coordinator with a background in reading instruction; structured tutoring sessions that included reading new material, reading familiar books, and focusing on word analysis and alphabetics; writing composition; and tutor training. Wasik (1998a) and others (Jenkins & Jenkins, 1987; Reisner, Petry, & Armitage, 1990; Venezky & Jain, 1996) also recommended that tutoring be coordinated with classroom instruction, although well-designed studies on this issue are lacking. The fluency intervention we describe includes many features identified in effective tutoring programs: a structured format, a focus on alphabetics and high-frequency words, tutor training, and tutor scaffolding and modeling.

Research on paraeducator-supplemented instruction provides another source of information on effective tutoring. It includes studies of kindergarten and first-grade literacy interventions implemented by instructional assistants (Blachman et al., 1994; Gunn, Biglan, Smolkowski, & Ary, 2000; Gunn, Smolkowski, Biglan, & Black, 2002; Gunn, Smolkowski, Biglan, Black, & Blair, 2005; Simmons, Kame'enui, Stoolmiller, Coyne, & Harn, 2003; Torgesen, Wagner, Rashotte, et al., 1999; Vadasy, Jenkins, & Pool, 2000; Vadasy, Sanders, & Abbott, in press; Vadasy, Sanders, Jenkins, & Peyton, 2002; Vadasy, Sanders, & Peyton, 2006). Critical features of effective paraeducator-implemented instruction include training and research-based standard treatment protocols that paraeducators can learn to use with fidelity.

Research Questions

This study was designed to assess effects of a repeated reading intervention, *Quick Reads* (Hiebert, 2003), with incidental word-level scaffolding instruction on student gains as compared to regular classroom reading instruction. Research questions were the following:

1. What are the direct effects of this intervention, provided by paraeducators to pairs of second- and third-grade students with low to average passage-reading fluency (PRF), on students' word reading, fluency, and comprehension gains?

2. What are the unique effects of this intervention after accounting for classroom oral text reading (OTR) time, pretest rapid automatized naming (RAN), and pretest word reading accuracy? Are treatment effects moderated by these variables?

We expected the greatest reading fluency gains to occur for students with stronger initial word reading accuracy, as well as for students who received more classroom oral reading practice (relative to their peers). Additional oral reading practice might boost fluency development; although as Berninger et al. (2001) suggested, subtypes of students with poor fluency may require differential treatments to address specific problems in lexical retrieval and coordination of language processes. We were unable to identify subtypes of fluency deficits in this study, and we assumed that classroom oral reading practice opportunities would generally benefit fluency outcomes. We therefore collected information on text reading opportunities provided during classroom reading instruction for both treatment and control students, hypothesizing that these activities might benefit both groups.

For descriptive purposes, we also recorded classroom instructional time allocated to word identification and comprehension skills, as well as organizational features of classroom reading instruction, such as grouping and use of time (Cameron, Connor, & Morrison, 2005). Findings from recent studies using classroom observational systems (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Taylor, Pearson, Peterson, & Rodriguez, 2005) have suggested that reading instruction varies along several dimensions across classrooms, including grouping strategies, time spent on salient instructional activities, and the interaction of classroom instruction and student skill levels. As Smith and Siegel (2006) noted, attention to routine practice conditions may inform how to best scale up effective reading interventions. In this study paraeducators rather than researchers were used to implement instruction, and a high fidelity of implementation was sought.

Method

Participants

Student referral and screening. In the fall of the academic year, second- and third-grade teachers from 13 urban, public elementary schools were asked to refer students who (a) had never been retained, (b) had low rates of reading fluency or comprehension, and (c) would benefit from a fluency intervention (i.e., students with adequate word reading skills to benefit from fluency instruction). Once active parent consents were obtained, referred students were screened for eligibility using two grade-level passages from the Oral Reading Fluency subtest of the Dynamic Indicators of Basic Early Literacy Skills (Good & Kaminski, 2002). Students whose performance was in the 10th to 60th percentile range (approximately averaging 34th percentile) for their grade level on the mean of the two passages were considered eligible for participation (60th percentile was approximated by solving for the respective fluency rate value corresponding to $Z = 0.25$; Hasbrouck & Tindal, 2006). This performance range was specifically 11 to 62 words correct per minute (wcpm) for second graders and 21 to 82 wcpm for third graders. Teachers referred students with a wide range of fluency for study participation. It should be noted that by Grades 2 to 3, reading rate becomes an important reading target in schools. As a result, many students had low rates of reading fluency and below-grade-level decoding skills.

Group assignment. Group assignment was a two-stage process. First, eligible students were randomly assigned to dyads (pairs of students) within grade and school using a random number generator. Although it would have been preferable to randomly assign students to dyads within classrooms in order to minimize extreme mismatches between students within a dyad, there were too few eligible students within classrooms to make this practical. Nevertheless, there were sufficient numbers of eligible students for random assignment of dyads within grades (within schools). For schools with uneven numbers of students within grades, we used random selection to identify singletons that were subsequently excluded from participation. Dyads were then randomly assigned to one of two conditions: treatment (supplemental fluency tutoring instruction) or control (no tutoring; classroom instruction only).

Attrition. After group assignment, the sample comprised 96 students (48 dyads) in the treatment condition and 92 students (46 dyads) in the control condition. By the end of the study, 14 treatment and 12 control students were lost to attrition (14%). To ensure an operational definition of treatment as well as an unbiased attrition pattern across treatment and control groups, we removed any dyad member from study participation if the corresponding member moved from the school. (Although control pairs did not necessarily receive reading instruction together, we assumed that control pairs shared common reading curricula due to the within-grade, within-school pairings.) The sample used for analyses thus comprised 82 treatment students (41 dyads) and 80 control students (40 dyads). As reported in Table 1, there were no significant differences between groups on grade or status variable frequencies (all $ps > .05$).

Tutors. A total of 22 tutors were recruited from their school communities. Tutors' educational levels, general tutoring experience, and experience working with second and third graders varied. All but one had already been working at the school as either an instructional assistant or tutor. Prior to the study, tutors had a range of 0 to 11 years of reading tutoring experience ($M = 3.6$ years, $SD = 3.43$), and all tutors had at least a high school diploma (15 had bachelor's degrees, 5 with teaching certificates). The average educational attainment of tutors in this study matched the paraeducator competency requirements under the No Child Left Behind Act of 2001. Most tutors (91%) were female, and six (27%) were of minority heritage.

Intervention

Treatment students received supplemental tutoring in dyads for 30 min per day, 4 days per week, for 15 weeks (November to March) using the *Quick Reads* (Hiebert, 2003) fluency program. Students assigned to the control group received regular classroom instruction, whereas treatment students received tutoring in their respective pairs. Classroom teachers reported that most treatment students ($n = 58$, or 70%) missed some portion of classroom reading instruction. For 15 students (18%), the *Quick Reads* intervention served as added reading instruction time: These students typically missed the nonreading activities and instruction such as chess club, computer lab, math, physical education, science, and social studies. Teachers of 9 students did not report the instruction missed during tutoring.

Table 1
Student Characteristics

Characteristic	Treatment *N*	Treatment %	Control *N*	Control %	$\chi^2(1, N = 162)$
Grade 2	58	70.7	52	65.0	0.61
Male	47	57.3	51	63.8	0.70
Minority	56	68.3	57	71.3	0.17
Asian	16	19.5	10	12.5	
Black	22	26.8	23	28.8	
Hispanic	15	18.3	22	27.5	
Mixed/other	3	3.7	2	2.5	
English-language learner	19	23.2	18	22.5	0.01
Special education	13	15.9	15	18.8	0.24
Title 1	63	76.8	58	72.5	0.40

Note. Treatment group ($N = 82$), control group ($N = 80$). Chi-square tests of independence were used to compare categorical frequencies between groups. All $ps > .05$.

The *Quick Reads* program includes short, nonfiction passages written for grade levels 1 to 6. Each grade level includes nine topics based on national and state curriculum standards for science and social science. Five passages are written to develop knowledge about each topic. For example, for Level B (second grade), science topics include "Water and Us," "Weather," and "Rocks." Level B social studies topics include "Maps," Money," and "Jobs Around Us." An important feature of the *Quick Reads* program is its attention to text features to build fluency and comprehension. The number of unique or different words is minimized, and 98% of words used in the texts are high-frequency words or words that reflect grade-level phonics and syllable patterns. Repeated word exposures are designed to build sight word learning. Rare words and singletons are minimized, as students are unlikely to acquire these words as sight words from single exposures and are unlikely to practice them in classroom texts. These text characteristics are hypothesized to develop underlying lexical accuracy and automaticity skills often overlooked in traditional repeated reading remedial interventions.

Quick Reads is designed for classroom or small-group use, either in regular reading instruction or as a supplemental intervention. The number of passages students cover daily and the length of the intervention depend on how it is used. If a teacher follows the recommended classroom instructional routine, students use *Quick Reads* for 15 min a day for one semester, or 18 weeks. Each passage is read three times:

1. First read. The teacher activates background knowledge about the topic and asks students to find two words that are challenging. Students read the passage aloud or silently and then write notes or phrases of key ideas.

2. Second read. The teacher reads aloud with the students, setting a model for fluent reading, all reading aloud at the target rate of 1 min. The teacher asks students to "tell the one thing the author wants you to remember."

3. Third read. The teacher instructs students to read as much of the passage as they can read in 1 min. The students then read silently for 1 min, and when the time is up each student records the number of words read. The teacher and student review two comprehension questions together.

The teacher's manual from the *Quick Reads* program outlines placement procedures for students with passage-reading performance of (a) at least 90% accuracy and at least a rate of 50 words per minute (wpm), (b) less than 90% accuracy or a rate of less than 50 wpm, and (c) less than 90% accuracy and a rate of less than 50 wpm. For students in the last category, the manual suggests a modified instructional routine that might include instruction in word reading skills. The manual also suggests teaching options to develop vocabulary, word identification, and comprehension skills. For example, activities are suggested for teaching vocabulary or identifying the main idea of the passage.

Tutoring sessions. Rather than expect tutors to choose an appropriate activity to add to the repeated reading steps, we created an instructional package similar to what is suggested in the *Quick Reads* manual. The teacher manual is written for classroom or small-group instruction and assumes that the teacher chooses the enrichment activities, coordinated with student need and other reading instruction. We added brief word-level instruction to meet the needs of the many students with low word reading skills who were referred for study participation, and we allowed tutors up to 5 min per session for this instruction as needed. (We also measured the amount of phonics/word study instruction provided in the classroom to understand better how the intervention coordinated with classroom instruction for low decoders in particular.) All instruction for this intervention was scripted, as described here, to ensure instructional consistency. Each tutoring session had six steps, as follows:

1. Letter/sound practice. Previous experience with an earlier cohort of *Quick Reads* students (Vadasy & Sanders, in press) led us to expect that second- and third-grade students with poor fluency would benefit from brief instruction and review in the alphabetic principle, particularly two-letter spelling patterns, as well as supportive correction strategies for their word miscues. Although this extension activity is not specifically suggested in the teacher's manual, we believed it would strengthen the program for the less skilled students in this study, and it was brief enough not to weaken the recommended intensity of the *Quick Reads* instruction (recommended for 12- to 15-min sessions to cover one passage). We therefore designed and scripted an extension activity for this *Quick Reads* field test that allowed tutors to review letter sounds if needed and provide scaffolded assistance in decoding difficult words. For up to 5 min of each session, tutors used a set of letter sound cards to review and practice accurate and automatic letter–sound correspondences, including vowel teams and consonant blends. Tutors were instructed to provide this practice only for letters and sounds that were problematic for students. If the student could not yet identify the sounds, the tutor directed the student to point to the letters on the cards and say the letter name, picture cue, and letter sound. For letters the student could not automatically match with a sound, the tutor pointed to the letters and asked the student to say the sounds. Time for review was allotted to each student as needed.

Tutors were also trained to provide scaffolding for word reading attempts with graduated levels of assistance to encourage students to apply their alphabetic and decoding skills. Corrective and supportive strategies the tutors used included (a) referring to the letter sound card to retrieve a letter sound, (b) encouraging the student to stretch out the sounds and then say the word fast, (c) assisting the student in segmenting a multisyllable word and then putting the parts together, and (d) telling the student an irregular nondecodable word and having the student reread the word.

2. First passage reading. Tutors introduced the main idea for the first passage, and students skimmed the passage to find difficult words to practice before passage reading. Students then took turns reading and following along with their finger.

3. Second and third passage reading. Both the tutor and students read the passage aloud together twice, with the tutor modeling smooth, accurate, and fluent reading.

4. Fourth passage reading. Each student completed a 1-min timed reading for which the tutor recorded the students' reading rates and accuracies.

5. Comprehension. Tutors and students discussed two comprehension questions.

6. Reading of new passage/rereading of previous passage(s). As time permitted, students reread the previous passage or began a new passage (following the first five steps outlined previously). Students completed Steps 1 through 5 for at least two passages per session.

Quick Reads placement and coverage. *Quick Reads* passages are organized by grade level (A = first grade, through F = sixth grade). Each *Quick Reads* level has three books, and each book contains six content areas with five passages per content area, for a total of 90 passages per level. We placed dyads into levels based upon the grade level for which their average pretest reading fluency most closely matched 50th percentile (Hasbrouck & Tindal, 2006). Our sample, after attrition, included 29 dyads placed into Level B and 12 dyads placed into Level C. One dyad originally placed in Level B was moved back to Level A, but all other dyads moved forward to Levels C or D after completing the previous level.

For each student's session, tutors recorded attendance, including the *Quick Reads* passage(s) covered and the fluency rate and accuracy for each timed reading. Treatment students completed an average of 95 passages (SD = 18.2), attended an average of 50 tutoring sessions (SD = 5.8) or 25 hr of intervention, and averaged 1.9 passages read per session (SD = 0.23; range = 1.5–2.9). To determine the difficulty level of the passages students read, we computed the accuracy rate across all attended sessions on *Quick Reads* levels. On average, students read at 95% accuracy within Level A and at 97% accuracy within Levels B, C, and D. These estimates suggest that the students read relatively difficult text at an instructional level for which students needed assistance. More difficult repeated reading materials may be associated with greater fluency improvements (Kuhn & Stahl, 2003).

Tutor training. Tutors participated in one initial 4-hr training session by project staff. Training included an overview of reading fluency development and the repeated reading method. Research staff then modeled the use of *Quick Reads* materials and demonstrated procedures for adding instruction/scaffolding in decoding. The tutors practiced the protocols during training and received immediate feedback. Following this training, coaches visited tutors biweekly to provide follow-up training and modeling and to collect data on protocol fidelity.

Tutor coaching. Throughout the 15-week intervention, research staff supported and conducted observations of the tutors. Researcher coaches were assigned to specific tutors and conducted a minimum of six observations on each tutor (at least two observations per dyad). Coaches met monthly to discuss tutoring implementation progress.

Tutor observations. To monitor treatment implementation fidelity, we collected data via observation forms on (a) tutor adherence to scripted *Quick Reads* protocols, (b) tutor instructional behaviors, and (c) student progress in terms of the amount of time spent actively engaged in reading passages. Tutors' fidelity to protocols was measured using a 5-point rating scale of 1 (*never*) to 5 (*always*) for each intervention step previously described. Tutor instructional behaviors were measured using the same 5-point scale for six criteria that included "maximizes time on instruction," "quick pace/smooth transitions/minimal pauses," "uses appropriate specific praise," "materials are organized," "maintains accurate attendance records," and "provides appropriate error correction/scaffolding." Student progress was measured by recording the amount of time (in seconds) students were orally reading text. Prior to onsite tutor observations, we established interobserver reliability among the five researcher–observers using five videotaped *Quick Reads* sessions. Each observer viewed and rated each taped session using the observation criteria. From these ratings, interobserver reliabilities were computed. Internal consistency for the five raters was .88 for tutoring protocol fidelity and .90 for tutor instructional behaviors. Reliability for text reading time ranged from .88 to 1.00 and averaged .95 (all $ps < .05$). Across 170 observations (approximately 8 per tutor and 4 per dyad), adherence to protocols averaged 4.76 ($SD = 0.20$) and tutor instructional behaviors averaged 4.76 ($SD = 0.18$). Each student (within their dyad) spent an estimated average of 10.4 min per session ($SD = 3.16$) actively engaged in oral reading.

Student Assessments

Students were individually assessed by trained testers unaware of group assignment on RAN and four reading subskills that were hypothesized to be differentially affected by intervention: word reading accuracy, word reading efficiency, fluency, and comprehension. Except for two submeasures of fluency, norm-referenced standard scores were used for analyses. In the measure descriptions that follow, published reliabilities are provided, as well as reliabilities for our sample (internal consistencies are Cronbach's alpha).

1. RAN was measured at pretest only using the Letter Naming subtest of the Rapid Automatized Naming/Rapid Alternating Stimulus tests (Wolf & Denckla, 2005). For this subtest, students were presented with a card that had five randomly sorted letters (*a*, *d*, *o*, *p*, *s*) repeated 10 times each and were asked to say the names of the letters as quickly as they could. The raw score was the total number of seconds the student used to name all of the letters. Test–retest reliability reported in the test manual is .87 for elementary grades. We also measured students on the Number Naming subtest to obtain concurrent validity: The correlation between Letter Naming and Number Naming (in number of seconds) was .79.

2. Word reading accuracy was measured using the Word Identification subtest from the norm-referenced, standardized Woodcock Reading Mastery Test—Revised/Normative Update, Form H (Woodcock, 1987/1998). Students were required to read increasingly difficult words, and testing was discontinued after six consecutive incorrect responses. Split-half reliability reported in the test manual averages .99 for Grades 1 to 3. Internal consistencies for our sample were .94 at pretest and .92 at posttest.

3. Word reading efficiency was measured using the Sight Word subtest from the norm-referenced, standardized Test of Word Reading Efficiency, Form B (Torgesen, Wagner, & Rashotte, 1999). The Sight Word subtest required students to read as many words as possible in 45 s from a list of increasingly difficult words. Test–retest reliability reported in the test manual for 6- to 9-year-olds is .96. For our sample, internal consistencies were .94 at pretest and .95 at posttest.

4. Fluency was the primary skill targeted in the intervention and was assessed two ways: in a raw-score framework as PRF and in a norm-referenced framework as fluency rate. Although a norm-referenced measure of fluency can provide a generalizable measurement of students' fluency rate, we considered PRF—in terms of wcpm performance—to be a meaningful indicator of students' responsiveness to intervention. Thus, we measured students' PRF using two passages drawn from the Dynamic Indicators of Basic Early Literacy Skills: one grade-level passage used at each test interval (uniform passage; for second graders, this was "If I Had a Robot," and for third graders, this was "My Friend") and one grade-level alternate passage at each test interval. Alternate passages for second graders included "Roller Coaster" and "Drift Bottle"; for third graders, alternate passages included "Fieldtrip" and "Parents." For each passage, students read aloud while the tester recorded errors, and testing was discontinued after 1 min. Words omitted, words substituted, and hesitations of more than 3 s were scored as errors. For our sample, the correlations between the uniform second- and third-grade passages were .88 and .91 at pretest and posttest, respectively, and the correlations between the uniform and alternate passages were .84 and .86 for pretest and posttest, respectively. Across passages, internal consistencies (using words as items) ranged from .96 to .98.

We assessed PRF using both uniform (PRF–U) and alternate (PRF–A) passages to minimize measurement error from potential passage nonequivalence effects (by using a uniform passage) and potential passage memory effects (by using alternate passages). Although the use of a uniform passage introduces potential memory effects (i.e., the student may remember words in a passage read on a previous occasion and thereby be able to read the text faster; or the student may remember the story structure, which may prime faster text reading) and low generalizability (i.e., the uniform passage has a specific vocabulary and story structure that differ from other passages), any memory effects occurring for treatment students have an equal chance of occurring for control students. Whereas estimates of true gains across all students on the uniform passage would likely be inflated, estimates of treatment effects on gains using the uniform passage should be free of nonequivalence effects. Consistent with our reasoning, Jenkins, Zumeta, and Dupree (2005) found that use of uniform passage measurements (compared to alternate passages) measured fluency gains more reliably; however, memory effects were detected for the uniform passage at the 5-week retest.

Our second, norm-referenced, assessment framework for measuring fluency included the Rate subtest from the Gray Oral Reading Tests–4 Form B (GORT; Wiederholt & Bryant, 2001). For this subtest, students read passages aloud, beginning at their grade level. Performance on the grade-level passage determined whether students subsequently read a lower or higher level passage, and testing was discontinued when a basal and ceiling were established. The amount of time it took students to read each passage converted to a raw score, ranging from 0 to 5 for each passage read. To be consistent with our other norm-referenced measures, we transformed the GORT standard score distribution with a mean of 10 and standard deviation of 3 to have a mean of 100 and standard deviation of 15. Cronbach's alpha reported in the test manual is .92 for 7- to 8-year-olds. Sample internal consistencies were .84 at pretest and .91 at posttest.

5. Comprehension was assessed at pretest and posttest with the GORT Comprehension subtest. Students read passages aloud, beginning at their grade level, and were asked comprehension questions for each passage. Performance on the grade-level passage

determined subsequent passage reading, and testing was discontinued when a basal and ceiling were established. Standard scores were transformed to have $M = 100$ and $SD = 15$. Alternate form reliability reported in the test manual is .96 for 7- to 8-year-olds. Sample internal consistencies were .83 at pretest and .89 at posttest.

Classroom Literacy Instruction Observations

We hypothesized that a specific dimension of classroom literacy instruction would interact with group assignment: time spent on OTR. For example, teachers who spend more time on OTR may bolster control students' fluency skills in the same manner as that expected for treatment students. We therefore endeavored to quantify the classroom literacy instruction for all students in the intervention study. Fifty-two classroom teachers (or reading/resource room teachers, as some students received regular reading instruction with these teachers) were asked for permission to allow us to observe their midyear reading instruction on two separate occasions (approximately 1 month apart, in one of three combinations: December/January, January/February, or February/March). Six (12%) declined to participate.

Observation tool. We used an adapted version of the *Instructional Content Emphasis—Revised* (ICE–R; Edmonds & Briggs, 2003) for measuring classroom literacy instruction. The standard ICE–R includes the following four dimensions: main instructional category, grouping arrangement, instructional subcategory, and materials used. We simplified the measure because establishing interobserver reliability across all dimensions would have been enormously challenging. We therefore collected data on the first two dimensions only: main instructional category and grouping arrangement.

The main instructional category measures instructional time spent on 10 mutually exclusive literacy activities: concepts of print, phonological awareness, alphabetic knowledge, word study/phonics, spelling, oral language development, fluency building, text reading, comprehension, and writing/language arts. After reviewing sample classroom reading instruction videotapes, we identified the need for four additional mutually exclusive instructional activity codes: behavior management, evaluative feedback, transition time, and other types of nonliteracy instruction (i.e., math instruction). Activities coded as behavior management included the teacher reminding students of behavior consequences, reinforcing good behavior, and talking to students who were inattentive or off task. Activities coded as evaluative feedback included explaining procedures for an instructional task and providing error correction feedback. Activities coded as transition time included students putting materials away, cleaning up, waiting, and lining up.

In addition to these 14 activities, we purposefully added a code to measure instructional time spent on OTR. Although OTR overlaps with the activities described previously (in particular, fluency building and text reading), we wished to capture time specifically afforded to OTR opportunities similar to those in *Quick Reads* instruction (in contrast to fluency building, which includes repeated word reading; and text reading, which includes silent reading practice).

The grouping arrangement dimension, which overlapped with the main instructional category activities, measured the amount of time the teacher grouped students for instruction in whole class, small-group, pair, independent, and individualized arrangements. During each of these instructional formats, students' overall level of engagement was rated using a 3-point rating scale (1 = *low*, 2 = *moderate*, and 3 = *high engagement*).

Recording process. Observations were conducted for the entire duration of teachers' literacy blocks. Observers began timing at the beginning of the observation. When instruction began, observers coded the teacher's first instructional activity, and thereafter recorded each clock time (running forward from zero) associated with instructional change, along with the appropriate instructional codes. Time entries and codes were entered into a database, and the time spent on each code was computed automatically for each teacher for each observation occasion.

Observers and reliability. Three certificated teachers who were tutor observers also served as classroom instruction observers. Each observer studied the ICE–R manual and coding instructions and participated in several training sessions to review the measure. Observers were trained by Patricia F. Vadasy, and, to establish reliability (prior to onsite observations), observers used the ICE–R to code one 60-min videotape of language arts instruction for a first-grade classroom at one of the schools participating in the study (first grade was used because we did not wish to bias potential observations of second- and third-grade classroom teachers). To calculate reliability, we sectioned total videotape time (60 min) into 10-min intervals (the first 10 min, the second 10 min, etc.) and treated each interval as one observation. For each observer, time spent on each activity per observation was computed. Interobserver correlations were .70 or higher, and Cronbach's alpha ranged from .79 to .99.

Observation results. Although we had planned to conduct three observations of each classroom's literacy block, coordinating teachers' schedules with those of our small group of observers proved extraordinarily difficult. Our compromise was to conduct two observations per teacher. For each teacher, the length of time spent on each activity was averaged across the two observations. Table 2 provides a summary of teachers' average midyear time spent on each activity from the first dimension (main instructional category). Literacy blocks ranged from 32 to 132 min and averaged 76.6 min ($SD = 21.03$). On average, teachers spent the majority of their time on comprehension (27% of the average amount of time), text reading, and transitioning students from one activity to another. As was expected of second- and third-grade reading instruction, teachers spent the least amount of time on concepts of print, phonological awareness, and alphabetic knowledge (i.e., less than 30 s). Eighty-five percent of average OTR time (11.9 min) overlapped with average text reading time; in other words, 66% of general text reading time was OTR. The remaining 15% of average OTR time overlapped with word study (3%), fluency building (3%), comprehension (4%), writing (3%), and evaluative feedback (3%). Teachers primarily grouped students for whole-class ($M = 29.8$ min, $SD = 19.35$) or small-group ($M = 18.1$ min, $SD = 18.05$) instruction. Teachers were also observed implementing paired (4.2 min, 5%), independent (7.6 min, 10%), and individualized (9.6 min, 13%) instructional grouping. Finally, students were observed as having high engagement 68% of the time (51.9 min) and moderate engagement 15% of the time on average. Low engagement was rare at 4% of the time.

Table 2
Classroom Literacy Instruction Observations: Characteristics for Primary Dimension Subtypes

Name	Description	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Concepts of print	Print directionality, book parts, text features	0.3	0.86	—														
2. Phonological awareness	Rhyming, syllable or phoneme blending, segmenting, isolating	0.2	0.89	−.03	—													
3. Alphabetics	Letter identification and recognition	0.2	1.27	−.05	−.04	—												
4. Word study	Phonics, letter identification and recognition, decoding, sight words	6.3	7.58	−.21	−.05	−.15	—											
5. Spelling	Oral or written spelling, practice with patterns	0.9	1.87	**.60**	−.10	−.06	−.14	—										
6. Oral language	Teacher and students discuss words, books, songs, topics	1.6	2.39	.26	−.02	.17	.04	.04	—									
7. Fluency building	Students read aloud to build speed; accuracy; prosody for letters or sounds, words, text	0.8	1.73	.08	−.08	.08	.23	−.03	−.06	—								
8. Text reading	Students read orally or silently with class, small groups, individually	17.9	10.06	**−.31**	−.17	.01	.22	−.09	−.17	.19	—							
9. Comprehension	Vocabulary, prior knowledge, monitoring understanding, strategy instruction	21.0	12.64	.05	−.21	.06	−.16	.12	−.09	−.01	.13	—						
10. Writing	Composition, independent or group, mechanics, handwriting	5.0	7.18	.11	−.06	.03	.05	−.04	.09	−.01	−.26	**−.41**	—					
11. Behavior	Noninstructional time to manage behavior	1.3	2.61	−.10	−.09	.05	.02	−.11	−.07	−.08	.16	−.16	−.02	—				
12. Error correction	Teacher feedback on student errors, miscues	8.7	6.58	−.03	.12	.03	−.08	−.10	−.12	.09	−.22	**−.32**	**.38**	.01	—			
13. Other	Nonreading instruction (e.g., math concepts)	0.9	2.17	.08	−.09	−.07	−.17	.02	−.07	−.19	−.06	.05	.00	−.15	−.15	—		
14. Transitioning	Time to gain students' attention on tasks, to reorganize, or to move groups	11.5	5.06	−.03	.02	.03	.27	.17	−.17	.14	**.43**	.01	−.08	.28	−.03	−.24	—	
15. Oral text reading	Students working with teacher are reading aloud	14.0	8.79	−.22	−.21	.26	.20	−.10	−.17	**.33**	**.47**	−.08	−.18	.03	**.30**		−.22.23	—

Note. $N = 46$ teachers; 6 teachers missing data. All categories are nonoverlapping, except oral text reading; number of minutes of literacy block reported, calculated as the average from two separate midyear observations (1 month apart). Pearson's r is reported; statistically significant correlations at the .05 level are in bold.

Results

Data Analysis Strategy

Due to nesting structures present in our research design, a multilevel (hierarchical) modeling approach was adopted for analyzing group differences on pretests and gains. Specifically, we tested group differences on pretests using two-level models (students within classrooms) with group dummy coded (1 = treatment and 0 = control). Two-level models were also used to analyze pretest–posttest gains; for these analyses, group was effect coded (1 = treatment and –1 = control) in order to test treatment interactions. Pretest–posttest gains were analyzed two ways: The first set of analyses tested the direct effects of the treatment on outcomes, and the second set tested the unique effects of the treatment in the presence of classroom OTR time and pretest RAN and word reading accuracy, which effectively excluded 13 students whose teachers declined observation. For the second set of models, OTR and pretest scores were grand-mean centered for ease of interpretation. In both sets of models, we ignored dyad membership because (a) assignment to dyads was cross-classroom; (b) we reasoned that dyad membership would have less impact on gains than classroom reading instruction (particularly for controls); (c) we wished to test cross-level classroom OTR effects on outcomes; and (d) although a cross-classified multilevel model can account for dyad and classroom nesting structures, cross-classified models are far more complex than hierarchical models. For all hierarchical analyses, HLM was used (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, & Congdon, 2004; Rodenbush, Bryk, & Congdon, 2004); all other analyses were conducted in SPSS (1989–2004).

Pretests

Observed group means and standard deviations are reported in Table 3. According to Hasbrouck and Tindal (2006) norms, students ranged from the 10th to the 60th percentiles and averaged the 34th percentile on pretest PRF performance. According to students' fluency rate scores from the GORT (Wiederholt & Bryant, 2001), however, the sample averaged in the lower 10th percentile. Pretests also showed that the sample averaged in the lower 25th percentile in RAN, lower 40th percentile in word reading accuracy, lower 25th percentile in word reading efficiency, and lower 20th percentile in comprehension.

Results from our hierarchical pretest models revealed one significant difference between groups at study onset: The control group was 2.2 points higher than the treatment group on pretest word reading accuracy, $t(160) = -2.262$, $p < .05$. As expected, model results also showed significant variation between classrooms on both PRF measures and the norm-referenced fluency rate (chi-square test p values $< .001$); nevertheless, no reliable between-classroom variance was detected for pretest word reading accuracy, word reading efficiency, or comprehension.

Treatment-Related Relationships

We explored the relationships between treatment students' pretest–posttest gains and treatment-related variables, including *Quick Reads* passages read, rates of passages read per session, and whether students missed classroom reading instruction during tutoring (the majority of students were pulled out for 30 min of the typical 90-min literacy block). As shown in Appendix A, none of these variables were significantly related to student outcomes. (Although not shown in Appendix A, neither total hours of instruction nor tutor fidelity ratings were correlated with gains.) OTR, in contrast, positively affected gains on all measures except comprehension, regardless of group (see Appendix B).

Direct Treatment Effects on Pre–Post Gains

Results from our hierarchical linear models for pretest–posttest gains revealed that students' average conditional gains were significantly greater than 0 across all measures (all t-test p values $<$ .05; see Table 3 for observed mean gains). Direct treatment effects were detected for gains on word reading accuracy and all three

Table 3
Observed Pretests, Posttests, and Pretest-Posttest Gains

	Treatment						Control					
	Pretest		Posttest		Gain		Pretest		Posttest		Gain	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
RAN	87.7	10.12					90.5	9.99				
WR accuracy	94.3	7.63	97.8	7.04	3.5	5.66	96.5	6.09	98.3	6.25	1.8	5.29
WR efficiency	87.9	9.19	94.7	10.12	6.8	7.72	89.2	8.50	94.6	10.49	5.5	8.09
PRF-U	40.0	18.35	83.1	22.27	43.2	16.53	42.3	19.91	79.0	23.76	36.7	19.56
PRF-A	37.5	16.84	68.3	26.38	30.8	18.50	39.6	17.13	62.5	26.63	22.9	18.36
Fluency rate	77.0	8.23	88.6	13.13	11.6	9.62	78.6	8.07	86.8	12.10	8.2	9.25
Comprehension	84.8	13.09	92.8	15.72	8.0	13.74	87.6	13.71	92.9	16.22	5.4	16.12

Note. Treatment group $N = 82$, control group $N = 80$. Norm-referenced standard scores (raw scores adjusted for age) were used for all measures except PRF-U and PRF-A; for these two measures, words correct per minute were used. The control group performed significantly higher on the WR accuracy pretest. RAN = Letter Naming subtest from the Rapid Automatized Naming/Rapid Alternating Stimulus tests; WR accuracy = Word Identification subtest from the Woodcock Reading Mastery Test—Revised/Normative Update; WR efficiency = Sight Word subtest from the Test of Word Reading Efficiency; PRF-U and PRF-A = words-correct-per-minute performance on uniform and alternate passages, respectively, from the Oral Reading Fluency subtest from the Dynamic Indicators of Basic Early Literacy Skills; Fluency rate = Rate subtest from the Gray Oral Reading Tests-4 (GORT); Comprehension = GORT Comprehension subtest.

fluency measures but not for word reading efficiency or comprehension: On average, students in the treatment group gained 1.6 more standard score points than controls on word reading accuracy, $t(160) = 2.206$, $p < .05$; and 2.6 more points on fluency rate, $t(160) = 2.537$, $p < .05$. On PRF–U, treatment students had an estimated 5.8-wcpm advantage over controls, $t(160) = 2.276$, $p < .05$; and a 7.9-wcpm advantage on PRF–A, $t(160) = 3.008$, $p < .01$. Model results also revealed significant between-classroom variation on gains for all measures except comprehension (chi-square test p values $< .05$). Taking the square root of the total estimated variance (between-classroom + residual variance) as a pooled standard deviation, we calculated approximate treatment effect sizes (Cohen's d) and found d = .29, .31, .32, and .43, for gains in word reading accuracy, fluency rate, PRF–U, and PRF–A, respectively.

Conditional Treatment Effects on Pre–Post Gains

Our second, more complex set of hierarchical models tested the unique effect of treatment on student gains in the presence of classroom OTR time, pretest RAN, pretest word reading accuracy (WR), and corresponding interactions. As a reminder, these analyses excluded 13 cases due to the six teachers who declined to participate in classroom observations. As a check on the potential bias introduced into our models due to excluding these cases, we compared students who were excluded with those who were included and found no differences between groups on any variable included in our models: All t-test p values $> .05$ for RAN, WR, and all gains. As shown in Table 4, results from these models revealed significant unique treatment effects on word reading efficiency (approximate d = .32), PRF–U (d = .65), PRF–A (d = .81), fluency rate (d = .58), and comprehension (d =.51). The treatment effect on word reading accuracy gains detected in our direct effects model was now accounted for by the other variables (recall that the treatment group was significantly lower than the control group on WR pretest). Moreover, although direct treatment effects on word reading efficiency and comprehension were not detected in our prior direct effects models, unique positive treatment effects were found in the presence of OTR, RAN, WR, and interactions.

Unique OTR effects. Model results revealed that OTR had small but reliable unique effects on students' gains in word reading accuracy (d = .30), word reading efficiency (d = .33), PRF–U (d = .33), and fluency rate (d = .36). (To compute the effect sizes, we contrasted model-predicted student gains for 1 *SD* above the mean, OTR = 1, with student gains at the average, OTR = 0.) For example, students whose teachers spent 1 *SD* more on OTR (approximately 22.8 min; see Table 2) were estimated to have a 1.3-point advantage on word reading accuracy gain over those whose teachers spent less time (5.2 min), holding other variables constant.

Unique pretest effects. Results showed that RAN was uniquely predictive of higher gains in word reading accuracy (d = .20), both PRF measures (d = .38 and .39 for PRF–U and PRF–A, respectively), and fluency rate (d = .26). WR was also uniquely predictive: Students with higher WR were predicted to have smaller word reading accuracy gains (d = –.49) but higher gains in word reading efficiency (d = .23), PRF–U (d = .27), and fluency rate (d = .36).

Interactions. There were complex interactions present across all gain measures except PRF–A. Although there were no significant two-way Group × OTR interactions, there were three significant complex interactions involving group, OTR, and pretest measures (for PRF–U, there was a significant Group × RAN × OTR interaction; for comprehension, there was a significant Group × WR × OTR interaction; for both, there were significant four-way interactions). Significant interactions between group and RAN (for gains on PRF–U and comprehension) and between group and WR (for gains on word reading accuracy and efficiency, PRF–U, and fluency rate) were evident, as were interactions between RAN and OTR (for gains on word reading accuracy, both PRF measures, and comprehension) and RAN and WR (for gains on word reading accuracy and efficiency, and comprehension). In general, these interactions indicate that the benefits of a repeated reading intervention and/or increased classroom OTR for second- and third-grade students is dependent on students' initial RAN and WR skills.

To achieve better insight about these interactions, we created plots (see Figures 1–3) using model-predicted parameter estimates (see Table 4) in concert with selected values of the predictors as follows: Group was 1 = treatment, –1 = control; OTR was –1 = 1 *SD* below the mean (5.2 min of the literacy block), 0 = mean (14.0 min of the literacy block), and 1 = 1 *SD* above the mean (22.8 min of the literacy block); pretest RAN was –1 = 1 *SD* below the mean (10th percentile based on norms), 0 = mean (25th percentile based on norms), and 1 = 1 *SD* above the mean (50th percentile based on norms); and pretest WR (all values observed in the sample, from 76 to 114). Visual inspection revealed a few remarkable patterns. First, OTR practice—whether in the classroom (OTR) or in paired tutoring (treatment)—appeared to benefit students who were below (approximately) the 50th percentile on fall WR (irrespective of pretest RAN) on gains in word reading accuracy and word reading efficiency. This pattern was similar for gains on both PRF–U and fluency rate measures, with one exception. Students with very low RAN (bottom 10th percentile) and low WR appeared to have higher gains if they received both treatment and high OTR or received no treatment with low OTR (perhaps more classroom time allocated to word study development). Finally, inspection of Figure 3 (right side) illustrates the complexity of individual differences in comprehension gains: Students with very low to moderately low RAN (10th to 25th percentile) appeared, overall, to benefit from paired tutoring over no tutoring; that said, treatment students did not appear to benefit from added OTR in terms of comprehension gains, whereas control students did appear to benefit from added OTR. Taken together, these findings suggest that students with lower RAN will have the highest comprehension gains if only a moderate amount of OTR practice is employed. Nevertheless, students with average RAN did not appear to be differentiated by group in terms of comprehension; instead, it appeared that less OTR had positive benefits for these students.

Discussion

The present study evaluated the direct and indirect effects of a supplemental, paraeducator-implemented repeated reading intervention (*Quick Reads*) with incidental word-level instruction for second and third graders with low fluency skill. Results show clearly that students benefited from this intervention in terms of word reading and fluency gains. Specifically, our models that

Table 4
Conditional Effects of Group, Classroom Oral Text Reading, and Pretests on Student Gains

Effect	WR accuracy			WR efficiency			PRF-U			PRF-A			Fluency rate			Comprehension		
	Coefficient	*SE*	*t*(125)	Coefficient	*SE*	*t*(125)	Coefficient	*SE*	*t*(125)	Coefficient	*SE*	*t*(125)	Coefficient	*SE*	*t*(125)	Coefficient	*SE*	*t*(125)
Fixed effects																		
Conditional mean gain	2.70	0.47	5.8^{***}	5.97	0.75	7.9^{***}	38.83	1.38	28.1^{***}	27.09	1.67	16.2^{***}	9.45	0.75	12.6^{***}	6.67	1.17	5.7^{***}
Group[a]	0.63	0.41	1.6	1.11	0.46	2.4^{*}	4.93	1.43	3.5^{***}	6.53	1.02	6.4^{***}	2.37	0.65	3.6^{***}	3.24	1.17	2.8^{**}
OTR	1.33	0.39	3.5^{**}	2.25	0.69	3.2^{**}	5.01	1.26	4.0^{***}	2.71	1.50	1.8	2.94	0.63	4.6^{***}	−0.22	1.00	−0.2
RAN	0.89	0.39	2.3^{*}	0.77	0.63	1.2	5.77	1.07	5.4^{***}	6.26	1.73	3.6^{***}	2.10	0.92	2.3^{*}	1.15	1.12	1.0
WR	−2.23	0.41	-5.5^{***}	1.59	0.60	2.6^{*}	5.66	1.97	2.9^{**}	2.21	1.95	1.1	2.95	0.94	3.1^{**}	−0.74	1.28	−0.6
Group × OTR	0.35	0.34	1.0	0.24	0.44	0.5	−0.94	1.29	−0.7	−0.65	0.81	−0.8	0.36	0.61	0.6	−1.91	1.22	−1.6
Group × RAN	−0.51	0.38	−1.4	−0.22	0.51	−0.4	−3.57	1.30	-2.8^{**}	−1.26	1.20	−1.0	0.19	0.87	0.2	−3.86	1.32	-2.9^{**}
Group × WR	−0.83	0.42	-2.0^{*}	−1.98	0.55	-3.6^{**}	−3.76	1.72	-2.2^{*}	−3.17	2.08	−1.5	−1.89	0.88	-2.1^{*}	−1.91	1.63	−1.2
OTR × RAN	0.75	0.27	2.7^{**}	0.49	0.52	0.9	2.56	0.73	3.5^{***}	3.03	1.24	2.4^{*}	1.35	0.72	1.9	3.76	1.10	3.4^{***}
OTR × WR	0.33	0.34	1.0	0.81	0.55	1.5	1.01	1.79	0.6	0.68	1.95	0.3	0.57	0.96	0.6	−0.97	1.44	−0.7
RAN × WR	−1.16	0.54	-2.1^{*}	−1.54	0.65	-2.4^{*}	−2.24	1.69	−1.3	−2.23	1.71	−1.3	−1.59	0.84	−1.9	−4.32	1.59	-2.7^{**}
Group × OTR × RAN	−0.48	0.33	−1.4	−0.50	0.43	−1.2	−0.85	0.68	−1.3	−0.82	1.16	−0.7	−0.01	0.70	0.0	−3.40	1.45	-2.3^{*}
Group × OTR × WR	−0.65	0.36	−1.8	−0.84	0.48	−1.7	−3.56	1.52	-2.3^{*}	−3.66	2.14	−1.7	−1.46	0.81	−1.8	−0.46	1.48	−0.3
Group × RAN × WR	−0.07	0.50	−0.2	0.85	0.62	1.4	1.08	1.93	0.6	−1.42	1.88	−0.8	0.42	1.18	0.4	1.71	1.43	1.2
OTR × RAN × WR	−0.76	0.42	−1.8	−0.85	0.63	−1.4	−3.75	1.16	-3.2^{**}	−1.73	1.16	−1.5	−1.26	0.71	−1.8	−3.69	1.53	-2.4^{*}
Group × OTR × RAN × WR	0.41	0.35	1.2	0.48	0.60	0.8	3.19	1.11	2.9^{**}	0.64	1.46	0.4	0.39	0.83	0.5	5.24	1.27	4.1^{***}
Random effects	Var	*SD*	$\chi^2(44)$	Var	*SD*	$\chi^2(44)$	Var	*SD*	$\chi^2(44)$	Var	*SD*	$\chi^2(44)$	Var	*SD*	$\chi^2(44)$	Var	*SD*	$\chi^2(44)$
Classrooms, U_0	0.7	0.86	55.7	9.6	3.10	83.7^{***}	24.1	4.91	67.0^{*}	49.0	7.00	78.6^{***}	4.2	2.06	56.8	0.1	0.38	37.4
Residual, e	19.5	4.42		37.5	6.12		204.8	14.31		214.0	14.63		63.3	7.96		162.3	12.74	

Note. N = 46 teachers and 141 students (n = 71 treatment, n = 70 control). Degrees of freedom for conditional mean gains is 44; df = 125 otherwise. OTR = standardized (grand-mean centered) average midyear minutes spent on oral text reading; RAN = standardized (grand-mean centered) pretest Letter Naming standard score from the Rapid Automatized Naming/Rapid Alternating Stimulus tests. WR accuracy (as predictor) = standardized (grand-mean centered) pretest Word Identification standard score from the Woodcock Reading Mastery Test—Revised/Normative Update (WRMT-R/NU). For each outcome: pretest-posttest gains are analyzed; WR accuracy = WRMT-R/NU Word Identification; WR efficiency = Sight Word subtest from the Test of Word Reading Efficiency; PRF-U and PRF-A = words-correct-per-minute performance on uniform and alternate passages, respectively, from the Oral Reading Fluency subtest from the Dynamic Indicators of Basic Early Literacy Skills; Fluency rate = Rate subtest from the Gray Oral Reading Tests-4 (GORT); Comprehension = GORT Comprehension subtest.
[a] 1 = treatment; −1 = control.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

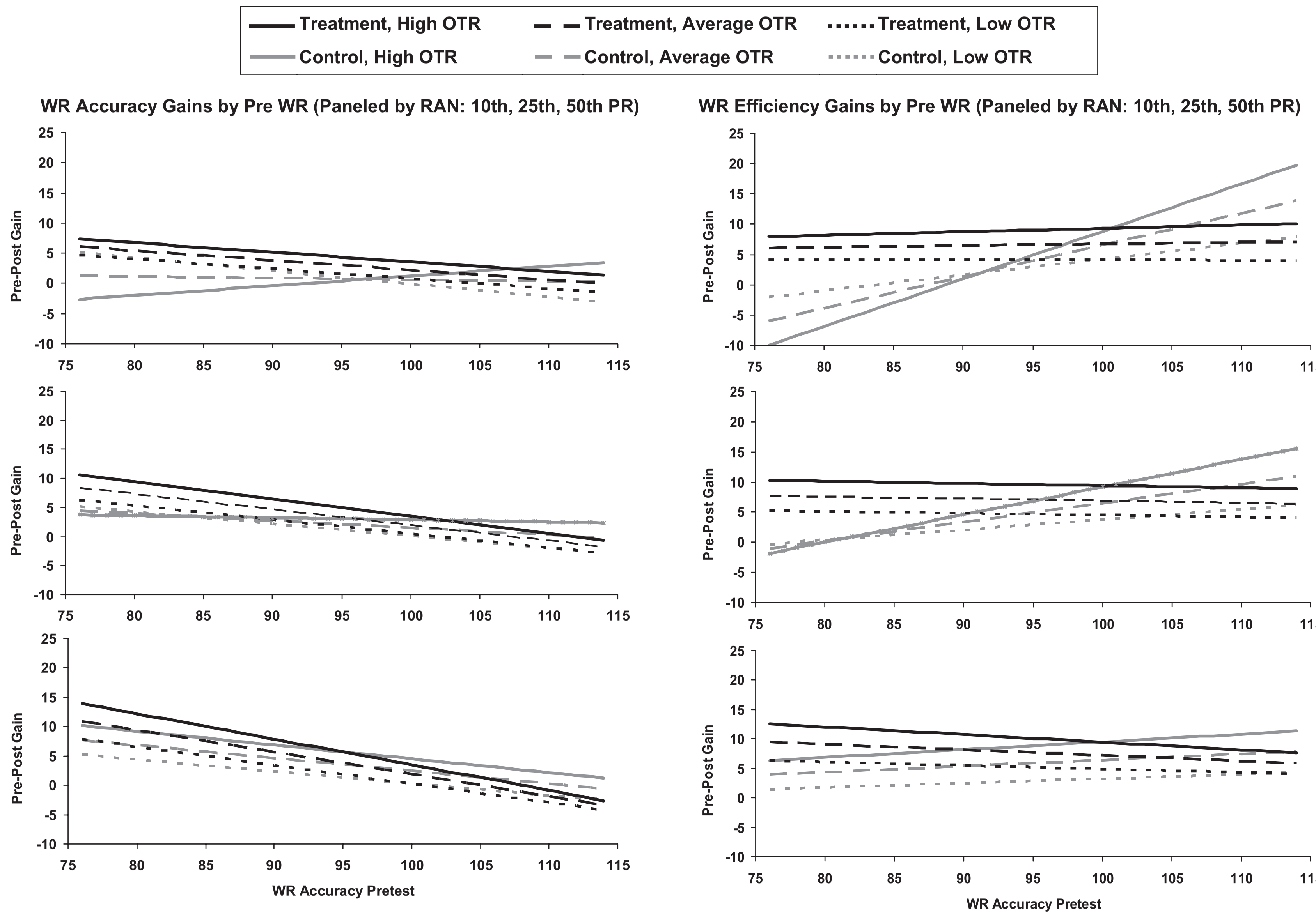

Figure 1. Model-predicted word reading (WR) accuracy and efficiency gains by pretest WR accuracy, paneled by three levels of rapid automatized naming (RAN): 10th percentile (PR; top), 25th PR (middle), and 50th PR (bottom). Lines represent experimental group and amount of classroom oral text reading (OTR).

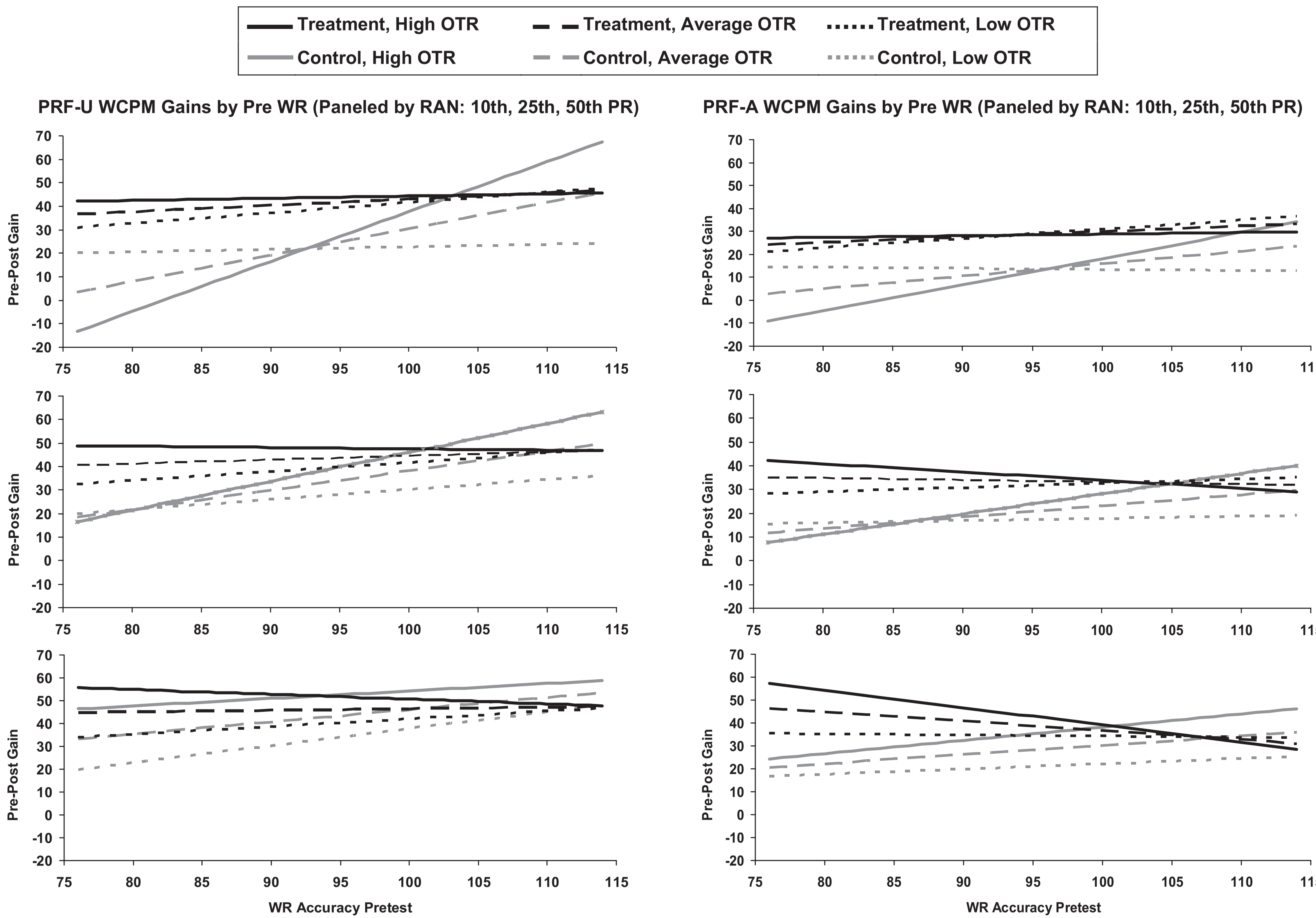

Figure 2. Model-predicted uniform (PRF–U) and alternate (PRF–A) words-correct-per-minute (WCPM) passage-reading fluency gains by pretest word reading (WR) accuracy, paneled by three levels of rapid automatized naming (RAN): 10th percentile (PR; top), 25th PR (middle), and 50th PR (bottom). Lines represent experimental group and amount of classroom oral text reading (OTR).

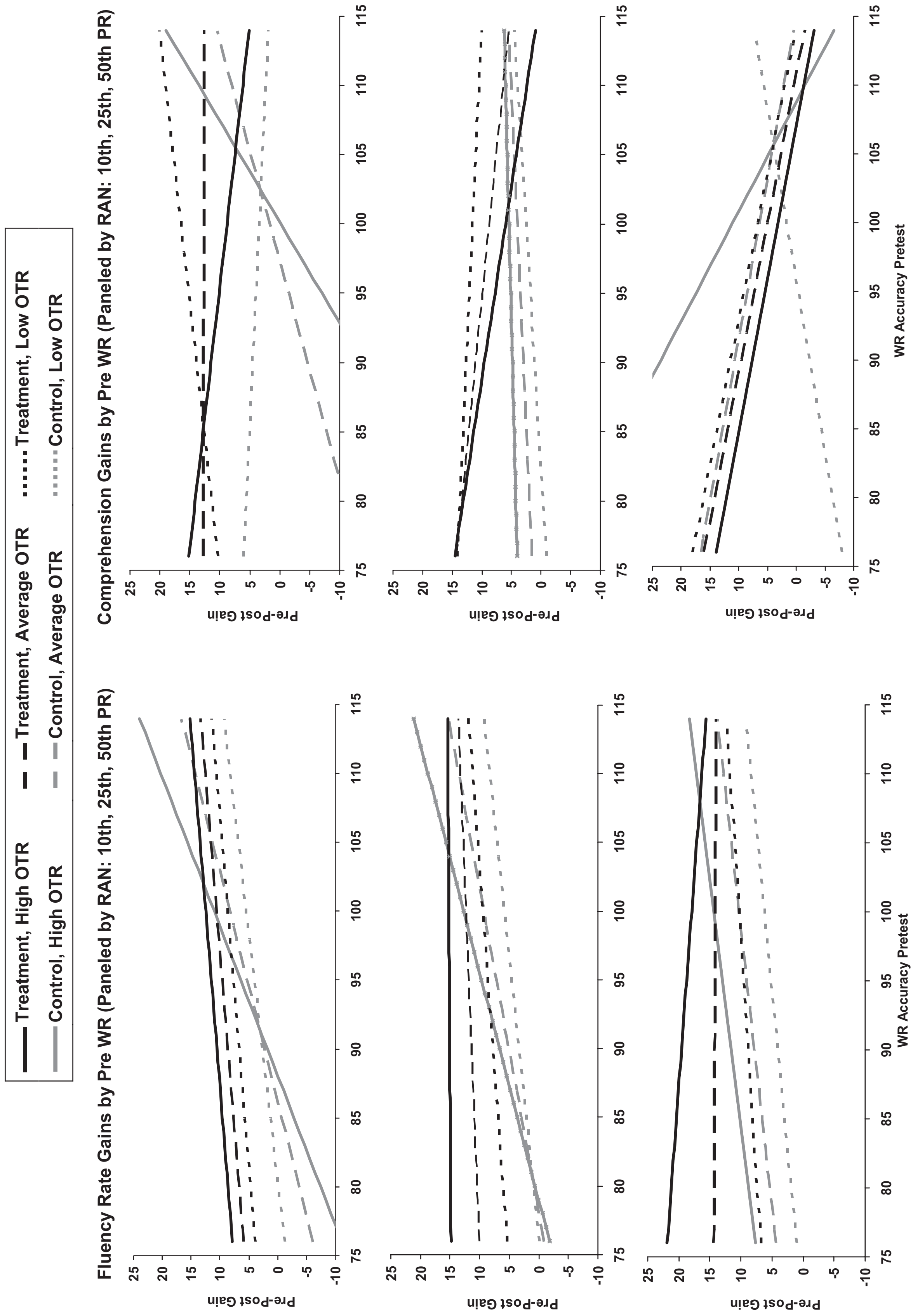

Figure 3. Model-predicted fluency rate and comprehension gains by pretest word reading (WR) accuracy, paneled by three levels of rapid automatized naming (RAN): 10th percentile (PR; top), 25th PR (middle), and 50th PR (bottom). Lines represent experimental group and amount of classroom oral text reading (OTR).

tested for direct treatment effects indicated that tutored students had significantly higher pretest–posttest gains in word reading accuracy and fluency. Dividing the treatment group's average wcpm gains (see Table 3) by 15 weeks of intervention yields average weekly gains of 2.9 and 2.1 wcpm for PRF–U and PRF–A, respectively. By both counts, this is well over the 1.1 wcpm/week expected for low to moderately low students in Hasbrouck and Tindal (2006). Nevertheless, the treatment group's mean posttest PRF performance was below the 50th percentile according to all three of our fluency measures (see Table 3).

Of our classroom observations, the characteristic of most interest in this study was the amount of time students spent reading aloud during the literacy block. When classroom OTR time, pretest RAN, and pretest WR were added to our second set of models, significant unique treatment effects were detected for gains on word reading efficiency, fluency, and comprehension, but not word reading accuracy.

Gains

Word reading accuracy and efficiency gains. Children entered this study with fluency performance ranging from the 10th to 60th percentiles according to Hasbrouck and Tindal (2006) norms on two grade-level passages, and in the bottom 10th percentile according to norms on the Rate subtest from the GORT. Verbal efficiency theory (Perfetti, 1992; Perfetti & McCutchen, 1987) suggests that students' beginning word reading skill and naming speed influence the consolidation of specific fluency component skills. The significant, complex interactions observed in our second set of models unmistakably suggest that effects of repeated reading practice on reading subskill gains are dependent on beginning word reading and/or RAN skills. Examination of the findings for word reading accuracy gains (see Table 4) showed that the repeated reading intervention with incidental word-level instruction (treatment) was reliably moderated by pretest WR: Holding the other variables constant, treatment students with lower pretest WR were predicted to have a slightly higher gain in word reading accuracy compared with controls, whereas the opposite was predicted to be true for students with higher pretest WR. Classroom OTR, pretest RAN, and their interaction had unique, positive effects on word reading accuracy gains. This suggests that students with higher RAN who receive more classroom OTR will have a cumulative advantage of approximately 3 points ($1.33 + 0.89 + 0.75 = 2.97$) in gains compared with students with lower RAN who receive lower amounts of classroom OTR, holding all other variables constant. Finally, this outcome was the only one in which pretest WR had a unique negative effect on gains, indicating that students with higher WR pretest had lower word reading accuracy growth. Furthermore, pretest WR interacted negatively with RAN in addition to group, revealing that students with low pretest WR and high RAN had higher gains. Findings for word reading efficiency gains (see Table 4 and Figure 1, right side) were similar to those found for word reading accuracy, although for this outcome treatment had a unique, positive effect and there were no unique RAN effects or interactions between RAN and classroom OTR.

Fluency gains. Reading fluency rate gains were measured in a raw-score and norm-referenced framework using grade-level reading passages (one uniform passage, PRF–U; and one alternate passage, PRF–A) and the norm-referenced GORT Rate subtest. For all three measures, treatment students had significantly higher gains than controls, and, similarly, students with higher RAN had higher gains. Except for PRF–A, classroom OTR and pretest WR were positively predictive of fluency gains; however, just like our models for word reading efficiency and accuracy, a significant negative interaction between pretest WR and experimental group was also detected: Treatment students with lower pretest WR were predicted to have higher gains than treatment students with higher pretest WR. Two other findings with respect to fluency gains are noteworthy. First, for both of our PRF passages (PRF–U and PRF–A), the benefits of effects of classroom OTR were positively dependent on pretest RAN: In other words, students with higher RAN had more raw score fluency gains if they were in classrooms with higher amounts of OTR. This interaction is consistent with our findings for word reading accuracy. Second, gains on our uniform passage fluency measure (PRF–U) resulted from reliable complex interactions between all predictors (see Table 4); although several interpretations of the three- and four-way interactions may be used, the predicted values of PRF–U gains illustrated in Figure 2 are remarkably similar to the other fluency measures.

Comprehension gains. After controlling for students' pretest levels and oral classroom text reading time, we detected a positive unique effect of treatment on comprehension gains. Nevertheless, this benefit of repeated reading intervention is qualified by several complex interactions among the other predictors in the model, highly similar to those detected for the PRF–U fluency measure. Predicted gain values (illustrated Figure 3, right side) appear to suggest that students with lower levels of RAN (10th or 25th percentiles) had higher gains if they were in the treatment group, and even higher gains, on average, if they were in classrooms that focused less time on OTR. In contrast, students with higher RAN (50th percentile) did not appear well-differentiated by which experimental group they were in.

Verbal efficiency theory (Perfetti, 1992; Perfetti & McCutchen, 1987) incorporates the notion of the autonomous lexicon, a bank of accurate word representations that underlie fluent reading. Findings from this study suggest that if students have lower word reading accuracy skills and an insufficiently encapsulated lexicon, higher RAN permits them to benefit from either type of oral reading practice across word and rate measures. Children with lower RAN and lower word reading accuracy had less fluency or comprehension gains from classroom OTR opportunities alone but were most advantaged by repeated reading instruction. Students' initial higher word reading skill uniquely predicted lower word reading accuracy gains but greater fluency rate gains. The role of word reading skill in explaining growth for students with low levels of reading fluency is consistent with previous studies (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Torgesen et al., 2001).

These findings suggest when particular types of repeated reading will be beneficial. For students performing within the emergent stage of reading fluency, like the second and third graders in this study, there were benefits from rereading the same texts chosen at an instructional level of difficulty. Repeated reading was assisted by trained tutors who provided both a model of fluent reading during two of the rereadings, as well as corrections and feedback during three of the readings. The intervention incorporated features found by others to be effective. These include use of a structured, research-based protocol; inclusion of alphabetic and word-level instruction; and rereading of texts. Although the supplemental intervention in the present study was not explicitly coordinated with classroom instruction, as others have recommended (Jenkins & Jenkins, 1987; Reisner et al., 1990; Venezky & Jain, 1996; Wasik, 1998a), *Quick Reads* texts are designed to coordinate with grade-level science and social science content and vocabulary. Furthermore, the two-level models in this study suggest that added oral reading practice in the classroom enhances fluency effects of the repeated reading intervention.

Limitations

Findings from this study should be considered in light of several limitations. First, although the intervention used in this study was primarily characterized as repeated reading, a small portion (up to 5 min) of each of the tutoring sessions included incidental alphabetic instruction and word-level scaffolding. Although most repeated reading interventions described in the literature do not include this feature, the teacher manual suggests that this is an option teachers might use in implementing *Quick Reads*. Second, students entered this study with a wide range of pretest fluency levels that reflected teacher referral patterns; nevertheless, students ranged from the 10th to the 60th percentiles on PRF performance, similar to students served in repeated reading programs (Faulkner & Levy, 1999; Hasbrouck et al., 1999). Third, we observed classroom instruction only twice during the intervention. As others have demonstrated (Connor, Morrison, & Petrella, 2004), dimensions of classroom instruction that our coding system did not capture, such as individual student engagement or quality of instruction (Connor, Son, Hindman, & Morrison, 2005), may have influenced student outcomes. Fourth, our findings on classroom literacy instruction are based on data excluding six teachers (and their students). It is possible that these teachers' refusal to participate reflects a systematic difference in their literacy instruction; however, outcomes of students within these classrooms did not reliably differ from outcomes of students whose teachers were observed. A final limitation of this study is that many variables expected to contribute to comprehension gains were not accounted for in this study, including vocabulary knowledge, strategy skills, and general language skills.

Instructional Implications

The fluency gains on both the norm-referenced and the PRF–U measure resulting from the supplemental repeated reading intervention were greatest for students with below-grade-level word reading skills. Higher levels of RAN appeared to allow students at this emergent stage of fluency development (Schwanenflugel et al., 2006) to benefit more from treatment, although this type of interaction was only reliably evident for one of our fluency measures (PRF–U). Inspection of the plots in Figures 1–3 suggests that if students enter second or third grade with average or higher word reading skills, a repeated reading intervention is not recommended to boost word reading accuracy or comprehension skills in particular. Students with lower word reading skills at onset, however, will likely benefit from this type of intervention on reading accuracy and fluency rate gains.

Second and third graders entered this study at different levels of component skill fluency. Word reading skills at pretest averaged in the lowest 40th percentile. The pretest range in word reading skills suggested that we add an incidental word-level instruction layer to the intervention; this instruction, together with the *Quick Reads* text features, may have enabled students with lower word reading skills to make the greatest gains relative to controls across reading outcomes. Gains in fluency and comprehension reflect, to some extent, an interactive compensatory mechanism (Rumelhart, 1977) for RAN and word reading skills. It appears that when bottom-up processing was slow due to both underlying slow RAN and inaccurate decoding, students could not make gains in fluency or comprehension from classroom oral reading practice opportunities. However, either high RAN or stronger word reading skill seems to enable compensatory processing and gains in fluency and comprehension. Students with high word reading pretest made high fluency and comprehension gains despite low RAN, and students with high RAN made comprehension gains despite low word reading. Higher RAN was associated with similar comprehension gains for both treatment and control students with low word reading pretest scores.

Findings support clear benefits from the opportunities students had to engage in oral reading practice during the classroom reading block. When students read aloud, teachers have opportunities to detect student difficulties, including poor prosody, decoding errors, and limited comprehension reflected in dysfluent reading. Teachers can use this information to adjust instruction for individual students and provide effective corrections and scaffolding. Teachers have no access to this information when students engage in silent reading.

The findings also support the benefits of supplemental repeated reading instruction using the *Quick Reads* program. Students with below-grade-level word reading skill made the greatest gains in reading skills due to intervention. As we noted, tutors implemented *Quick Reads* instruction with incidental word-level instruction. We believe that this adaptation is in line with instructional applications recommended in the *Quick Reads* teacher manual and is most appropriate for students who have not yet developed accurate and efficient word reading skills. These students are also most likely to benefit from the text characteristics of the *Quick Reads* program. Students with average or higher word reading accuracy may have benefited most from incidental and more individualized instruction in fluency and comprehension skills during classroom reading instruction.

Tutors in this study were paraeducators, and they implemented the intervention with a high degree of fidelity. There is growing evidence that teaching assistants and tutors can assume important pedagogical roles in early literacy instruction (Al Otaiba, Schatschneider, & Silverman, 2005; Gelzheiser, 2005; Hatcher et al., 2006), with corresponding calls for increased training and utilization of these individuals (Callas, 2001; Savage & Carless, 2005). Research is warranted on the specific instruction and curricula these individuals can implement most effectively.

This study specifically addressed limitations in previous research on repeated reading interventions. First, students were randomly assigned to conditions. Second, we considered multiple outcomes, including word reading accuracy and efficiency as well as fluency rate and comprehension outcomes. Third, because this was an efficacy trial, the intervention was implemented with a high degree of fidelity by paraeducators who were potential typical end users, and in school settings that reflected routine practice conditions. Fourth, the 15-week intervention was considerably more intense than the repeated reading interventions described in many previous studies. Fifth, the particular repeated reading intervention, *Quick Reads*, is unusually well specified in terms of text features and reading procedures often hypothesized to influence fluency outcomes. Finally, we conducted classroom observations to measure and account for the influence of classroom literacy instruction similar to that of the intervention on student outcomes. Specifically, we estimated OTR practice that students received in the classroom.

In summary, findings indicate that student word reading and RAN skills should be taken into account when identifying students for placement in a repeated reading intervention. The findings also underscore the value of classroom oral reading practice for students with low to moderate reading fluency and the importance of accounting for the role of classroom reading instruction experienced by children in supplemental reading interventions. Finally, findings support the difficulty described by others (Torgesen et al., 2001) of completely or quickly remediating poor fluency. This difficulty is not limited only to older students with cumulative fluency lags, as in this study we were unable to bring second- and third-grade students in the intervention up to grade-level fluency. Young students whose fluency is already constrained by limited word-level skills may require significantly greater amounts of repeated reading practice than employed in this intervention, as well as more intensive instruction to develop word-level proficiency.

References

Al Otaiba, S., Schatschneider, C., & Silverman, E. (2005). Tutor-assisted intensive learning strategies in kindergarten: How much is enough? *Exceptionality, 13,* 195–208.

Berninger, V. W., Abbott, R. D., Billingsley, F., & Nagy, W. (2001). Processes underlying timing and fluency of reading: Efficiency, automaticity, coordination, and morphological awareness. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 383–414). Timonium, MD: York Press.

Blachman, B. A., Ball, E. W., Black, R., & Tangel, D. M. (1994). Kindergarten teachers develop phoneme awareness in low-income, inner-city classrooms: Does it make a difference? *Reading and Writing, 6,* 1–17.

Blachman, B. A., Tangel, D. M., Ball, E. W., Black, R., & McGraw, C. K. (1999). Developing phonological awareness and word recognition skills: A two-year intervention with low-income, inner-city children. *Reading and Writing, 11,* 239–273.

Callas, M. (2001). Current and proposed special education legislation. *Child Psychology and Psychiatry Review, 6,* 24–30.

Cameron, C. E., Connor, C. M., & Morrison, F. J. (2005). Effects of variation in teacher organization on classroom functioning. *Journal of School Psychology, 43,* 61–85.

Chard, D. J., Vaughn, S., & Tyler, B. (2002). A synthesis of research on effective interventions for building reading fluency with elementary students with learning disabilities. *Journal of Learning Disabilities, 35,* 386–406.

Connor, C. M., Morrison, F. J., & Katch, L. E. (2004). Beyond the reading wars: Exploring the effect of child-instruction interactions on growth in early reading. *Scientific Studies of Reading, 8,* 305–336.

Connor, C. M., Morrison, F. J., & Petrella, J. N. (2004). Effective reading comprehension instruction: Examining Child × Instruction interactions. *Journal of Educational Psychology, 96,* 682–698.

Connor, C. M., Son, S.-H., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology, 43,* 343–375.

Edmonds, M., & Briggs, K. L. (2003). The Instructional Content Emphasis Instrument: Observations of reading instruction. In S. Vaughn & K. L. Briggs (Eds.), *Reading in the classroom: Systems for the observation of teaching and learning* (pp. 31–52). Baltimore: Brookes.

Faulkner, H. J., & Levy, B. A. (1999). How text difficulty and reader skill interact to produce differential reliance on word and context overlap in reading transfer. *Journal of Experimental Child Psychology, 58,* 1–24.

Fleisher, L. S., Jenkins, J. R., & Pany, D. (1979). Effects on poor readers' comprehension of training in rapid decoding. *Reading Research Quarterly, 15,* 30–48.

Foorman, B. R., Francis, D. J., Fletcher, J. M., Schatschneider, C., & Mehta, P. (1998). The role of instruction in learning to read: Preventing reading failure in at-risk children. *Journal of Educational Psychology, 90,* 37–55.

Fuchs, D., Fuchs, L. S., Thompson, A., Al Otaiba, S., Yen, L., Yang, N. J., et al. (2001). Is reading important in reading-readiness programs? A randomized field trial with teachers as program implementers. *Journal of Educational Psychology, 93,* 251–267.

Fuchs, D., Fuchs, L. S., Thompson, A., Al Otaiba, S., Yen, L., Yang, N. J., et al. (2002). Exploring the importance of reading programs for kindergarteners with disabilities in mainstream classrooms. *Exceptional Children, 68,* 295–311.

Gelzheiser, L. M. (2005). Maximizing student progress in one-to-one programs: Contributions of texts, volunteer experience, and student characteristics. *Exceptionality, 13,* 229–243.

Good, R. H., & Kaminski, R. A. (2002). *Dynamic Indicators of Basic Early Literacy Skills (DIBELS)* (6th ed). Eugene, OR: Institute for the Development of Educational Achievement.

Gunn, B., Biglan, A., Smolkowski, K., & Ary, D. (2000). The efficacy of supplemental instruction in decoding skills for Hispanic and non-Hispanic students in early elementary school. *Journal of Special Education, 34,* 90–103.

Gunn, B., Smolkowski, K., Biglan, A., & Black, C. (2002). Supplemental instruction in decoding skills for Hispanic and non-Hispanic students in early elementary school: A follow-up. *Journal of Special Education, 36,* 69–79.

Gunn, B., Smolkowski, K., Biglan, A., Black, C., & Blair, J. (2005). Fostering the development of reading skill through supplemental instruction: Results for Hispanic and non-Hispanic students. *Journal of Special Education, 39,* 66–85.

Hasbrouck, J. E., Ihnot, C., & Rogers, G. H. (1999). "Read Naturally": A strategy to increase oral reading fluency. *Reading Research and Instruction, 39,* 27–38.

Hasbrouck, J., & Tindal, G. A. (2006). ORF norms: A valuable assessment tool for reading teachers. *Reading Teacher, 59,* 636–644.

Hatcher, P. J., Goetz, K., Snowling, M. J., Hulme, C., Gibbs, S., & Smith, G. (2006). Evidence for the effectiveness of the Early Literacy Support programme. *British Journal of Educational Psychology, 76,* 351–367.

Hiebert, E. H. (2003). *Quick reads.* Parsippany, NJ: Pearson Learning.

Jenkins, J. R., Fuchs, L. S., van den Broek, P., Espin, C., & Deno, S. L. (2003). Sources of individual differences in reading comprehension and reading fluency. *Journal of Educational Psychology, 95,* 719–729.

Jenkins, J. R., & Jenkins, L. M. (1987, March). Making peer tutoring work. *Educational Leadership, 44*(6), 64–68.

Jenkins, J. R., Zumeta, R., & Dupree, O. (2005). Measuring gains in reading ability with passage reading fluency. *Learning Disabilities Research and Practice, 20,* 245–253.

Juel, C. (1996). What makes literacy tutoring effective? *Reading Research Quarterly, 31,* 268–289.

Juel, C., & Roper-Schneider, D. (1985). The influence of basal readers on first grade reading. *Reading Research Quarterly, 20,* 134–152.

Kame'enui, E. J., Simmons, D. C., Good, R. H., & Harn, B. A. (2001). The use of fluency-based measures of early identification and evaluation of intervention efficacy in schools. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 307–332). Timonium, MD: York Press.

Kuhn, M. R., & Stahl, S. A. (2003). Fluency: A review of developmental and remedial practices. *Journal of Educational Psychology, 95,* 3–21.

LaBerge, D., & Samuels, S. J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology, 6,* 293–323.

Levy, B. A., Abello, B., & Lysynchuk, L. (1997). Transfer from word training to reading in context: Gains in reading fluency and comprehension. *Learning Disability Quarterly, 20,* 173–188.

Menon, S., & Hiebert, E. H. (2005). A comparison of first graders' reading with little books or literature-based basal anthologies. *Reading Research Quarterly, 40,* 12–38.

Mercer, C. D., Campbell, K. U., Miller, M. D., Mercer, K. D., & Lane, H. B. (2000). Effects of a reading fluency intervention for middle schoolers with specific learning disabilities. *Learning Disabilities Research and Practice, 15,* 179–189.

Meyer, M. S., & Felton, R. H. (1999). Repeated reading to enhance fluency: Old approaches and new directions. *Annals of Dyslexia, 49,* 283–306.

National Reading Panel. (2000). *Report of the subgroups: National Reading Panel.* Washington, DC: National Institute of Child Health and Development.

No Child Left Behind Act of 2001, 20 U.S.C. 70 § 6301 *et seq.* (2002).

O'Shea, L. J., Sindelar, P. T., & O'Shea, D. J. (1985). The effects of repeated readings and attentional clues on reading fluency and comprehension. *Journal of Reading Behavior, 17,* 129–142.

Perfetti, C. A. (1985). *Reading ability.* New York: Oxford University.

Perfetti, C. A. (1992). The representation problem in reading acquisition. In P. B. Gough, L. C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 145–174). Hillsdale, NJ: Erlbaum.

Perfetti, C. A., & McCutchen, D. (1987). Schooled language competence: Linguistic abilities in reading and writing. In S. Rosenberg (Ed.), *Advances in applied psycholinguistics* (Vol. 2, pp. 105–141). Cambridge, England: Cambridge University Press.

Rashotte, C. A., MacPhee, K., & Torgesen, J. K. (2001). The effectiveness of a group reading instruction programs with poor readers in multiple grades. *Learning Disability Quarterly, 24,* 119–134.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. T. (2004). *HLM 6: Hierarchical linear and nonlinear modeling.* Lincolnwood, IL: Scientific Software International.

Raudenbush, S. W., Bryk, A. S., & Congdon, R. T. (2004). *HLM for Windows 6.0* [Computer software]. Lincolnwood, IL: Scientific Software International.

Reisner, E. R., Petry, C. A., & Armitage, M. (1990). *A review of programs involving college students as tutors or mentors in grades K-12.* Washington, DC: U.S. Department of Education.

Roth, S. F., & Beck, I. L. (1987). Theoretical and instructional implications of the assessment of two microcomputer word recognition programs. *Reading Research Quarterly, 22,* 197–218.

Rumelhart, D. E. (1977). Toward an interactive model of reading. In S. Dornic (Ed.), *Attention and performance* (Vol. 6, pp. 573–603). Hillsdale, NJ: Erlbaum.

Samuels, S. J. (1979). The method of repeated readings. *Reading Teacher, 32,* 403–408.

Samuels, S. J., Dahl, P., & Archwamety, T. (1974). Effect of hypothesis/test training on reading skill. *Journal of Educational Psychology, 66,* 835–844.

Savage, R., & Carless, S. (2005). Learning support assistants can deliver effective reading interventions for 'at-risk' children. *Educational Research, 47,* 45–61.

Schwanenflugel, P. J., Meisinger, E. B., Wisenbaker, J. M., Kuhn, M. R., Strauss, G. P., & Morris, R. D. (2006). Becoming a fluent and automatic reader in the early elementary years. *Reading Research Quarterly, 41,* 496–522.

Simmons, D. C., Kame'enui, E. J., Stoolmiller, M., Coyne, M., & Harn, B. (2003). Accelerating growth and maintaining proficiency: A two-year intervention study of kindergarten and first-grade children at risk for reading difficulties. In B. R. Foorman (Ed.), *Preventing and remediating reading difficulties: Bringing science to scale* (pp. 197–228). Timonium, MD: York Press.

Smith, V., & Siegel, L. S. (2006). *Early literacy instruction in kindergarten: Examining the implementation of a phonological awareness program in routine practice.* Unpublished manuscript, University of Alberta, Edmonton, Alberta, Canada.

SPSS. (1989–2004). *Statistical Package for the Social Sciences 13.0* [Computer software]. New York: McGraw-Hill.

Tan, A., & Nicholson, T. (1997). Flashcards revisited: Training poor readers to read words faster improves their comprehension of text. *Journal of Educational Psychology, 89,* 276–288.

Taylor, B. M., Pearson, P. D., Peterson, D. S., & Rodriguez, M. C. (2005). The CIERA school change framework: An evidence-based approach to professional development and school reading improvement. *Reading Research Quarterly, 40,* 40–69.

Torgesen, J. K., Rashotte, C. A., & Alexander, A. W. (2001). Principles of fluency instruction in reading: Relationships with established empirical outcomes. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 333–356). Timonium, MD: York Press.

Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (1999). *Test of Word Reading Efficiency.* Austin, TX: PRO-ED.

Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Rose, E., Lindamood, P., Conway, T., & Garvan, C. (1999). Preventing reading failure in young children with phonological processing disabilities: Group and individual responses to instruction. *Journal of Educational Psychology, 91,* 579–593.

Vadasy, P. F., Jenkins, J. R., & Pool, K. (2000). Effects of tutoring in phonological and early reading skills on students at risk for reading disabilities. *Journal of Learning Disabilities, 33,* 579–590.

Vadasy, P. F., & Sanders, E. A. (in press). Benefits of repeated reading intervention for low-achieving fourth- and fifth-grade students. *Remedial and Special Education.*

Vadasy, P. F., Sanders, E. A., & Abbott, R. D. (in press). Effects of supplemental early reading intervention at 2-year follow up: Reading skill growth patterns and predictors. *Scientific Studies of Reading.*

Vadasy, P. F., Sanders, E. A., Jenkins, J. R., & Peyton, J. A. (2002). Timing and intensity of tutoring: A closer look at the conditions for effective early literacy tutoring. *Learning Disabilities Research and Practice, 17,* 227–241.

Vadasy, P. F., Sanders, E. A., & Peyton, J. A. (2006). Code-oriented instruction for kindergarten students at risk for reading difficulties: A randomized field trial with paraeducator implementers. *Journal of Educational Psychology, 98,* 508–528.

Venezky, R. L., & Jain, R. (1996). *Tutoring for reading improvement: A background paper.* Unpublished manuscript.

Wasik, B. A. (1998a). Using volunteers as reading tutors: Guidelines for successful practices. *Reading Teacher, 51,* 562–570.

Wasik, B. A. (1998b). Volunteer tutoring programs in reading: A review. *Reading Research Quarterly, 33,* 266–292.

Wiederholt, J. L., & Bryant, B. R. (2001). *Gray Oral Reading Tests–4.* Austin, TX: PRO-ED.

Wolf, M., & Denckla, M. B. (2005). *RAN/RAS: Rapid Automatized Naming and Rapid Alternating Stimulus tests.* Austin, TX: PRO-ED.

Wolf, M., & Katzir-Cohen, T. (2001). Reading fluency and its intervention. *Scientific Studies of Reading, 5,* 211–239.

Woodcock, R. (1998). *Woodcock Reading Mastery Test-Revised/Normative Update.* Circle Pines, MN: American Guidance Service. (Original work published 1987)

Yuill, N., & Oakhill, J. (1988). Effects of inference awareness training on poor reading comprehension. *Applied Cognitive Psychology, 2,* 33–45.

(*Appendixes follow*)

Appendix A

Intercorrelations for Treatment Group

Measure	*M*	*SD*	*N*	1	2	3	4	5	6	7	8	9	10	11
Student assessments														
1. RAN pretest	87.7	10.12	82	—										
2. WR accuracy gain	3.5	5.66	82	.09	—									
3. WR efficiency gain	6.8	7.72	82	.10	.25	—								
4. PRF-U gain	2.9	0.74	82	.32*	.15	.51*	—							
5. PRF-A gain	2.1	0.77	82	.43*	−.07	.25	.46*	—						
6. Fluency rate gain	11.6	9.62	82	.31*	.16	.59*	.68*	−.02	—					
7. Comprehension gain	8.0	13.74	82	−.22	.08	.05	.56*	−.11	−.13	—				
Classroom reading instruction														
8. OTR	15.5	10.34	71	.10	.33*	.41*	.33*	.27*	.41*	−.08	—			
Treatment-related variables														
9. Passage coverage total	95.0	18.22	82	.03	−.05	−.02	.01	−.04	.01	−.17	.07	—		
10. Passage coverage rate	1.9	0.23	82	−.04	.00	−.06	−.11	.02	−.01	−.17	.07	.83*	—	
11. Reading instruction missed[a]	0.8	0.43	73	.11	.04	.12	.17	−.06	.05	−.15	−.05	.25	.16	—

Note. RAN = pretest score on the Letter Naming subtest from the Rapid Automatized Naming and Rapid Alternating Stimulus tests; WR accuracy gain = pretest-posttest standard score gain on the Word Identification subtest from the Woodcock Reading Mastery Test—Revised/Normative Update; WR efficiency gain = pretest-posttest standard score gain on the Sight Word subtest from the Test of Word Reading Efficiency; PRF-U and PRF-A = pretest-posttest words-correct-per-minute gains on uniform and alternate passages, respectively, from the Oral Reading Fluency subtest from the Dynamic Indicators of Basic Early Literacy Skills; Fluency rate = pretest-posttest standard score gain on the Rate subtest from Gray Oral Reading Tests-4 (GORT); Comprehension = pretest-posttest standard score gain on GORT Comprehension; OTR = average midyear minutes of classroom literacy spent on oral text reading; Passage coverage total = number of unique passages read; Passage coverage rate = number of unique passages read divided by number of tutoring sessions.

[a] 1 = tutoring occurred during classroom literacy instruction, 0 = otherwise.

* $p < .05$.

Appendix B

Intercorrelations for Control Group

Measure	*M*	*SD*	*N*	1	2	3	4	5	6	7	8
Student assessments											
1. RAN pretest	90.5	9.99	80	—							
2. WR accuracy gain	1.8	5.29	80	.18	—						
3. WR efficiency gain	8.2	9.25	80	.18	.34*	—					
4. PRF-U gain	2.4	0.87	80	.47*	.31*	.30	—				
5. PRF-A gain	1.5	0.80	80	.26*	.30*	.47*	.31*	—			
6. Fluency rate gain	5.5	8.09	80	.09	.37*	.63*	.57*	.21	—		
7. Comprehension gain	5.4	16.12	80	.13	.22*	.23*	.50*	.31*	.31*	—	
Classroom reading instruction											
8. OTR	13.3	9.32	70	.11	.28*	.37*	.38*	.32*	.35*	.16	—

Note. RAN = pretest score on the Letter Naming subtest from the Rapid Automatized Naming and Rapid Alternating Stimulus tests; WR accuracy gain = pretest-posttest standard score gain on the Word Identification subtest from the Woodcock Reading Mastery Test-Revised/Normative Update; WR efficiency gain = pretest-posttest standard score gain on the Sight Word subtest from the Test of Word Reading Efficiency; PRF-U and PRF-A = pretest-posttest words-correct-per-minute gains on uniform and alternate passages from the Oral Reading Fluency subtest from the Dynamic Indicators of Basic Early Literacy Skills; Fluency rate = pretest-posttest standard score gain on the Rate subtest from the Gray Oral Reading Test-4 (GORT); Comprehension = pretest-posttest standard score gain on GORT Comprehension; OTR = average midyear minutes of classroom literacy spent on oral text reading.

* $p < .05$.

Received November 21, 2006
Revision received July 31, 2007
Accepted August 28, 2007 ■