

Effects of Repeated Readings, Error Correction, and Performance Feedback on the Fluency and Comprehension of Middle School Students With Behavior Problems

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This study used a **multiple-baseline-across-students design** to examine the effects of repeated readings combined with systematic error correction and performance feedback on the reading fluency and comprehension of 4 middle school students attending an outpatient day treatment program for their behavior problems. Additionally, a brief prediction strategy was added to the repeated readings package during the third phase of the study. Results indicated a functional relationship of repeated readings with error correction and performance feedback on increased reading rate for 3 of the 4 students, and decreased errors for all 4 students. Additionally, improvement for both literal and inferential reading was demonstrated by all 4 students. The effects of the prediction component were inconclusive.

Special educators are beginning to make counterintuitive decisions regarding the instruction of students with emotional and behavior disorders (EBD). Intuitively, these educators might assume that students cannot be taught academic skills until the behavior problems are managed. This assumption has largely guided the educational programming of students with EBD (Gable, Hendrickson, Tonelson, & Van Acker, 2002; Levy & Chard, 2001; Wehby, Lane, & Falk, 2003). Focusing on behavior problems as a first priority has likely contributed to the lopsided distribution of instructional time in EBD classrooms, with minimal time spent addressing academic needs (Vaughn, Levy, Coleman, & Bos, 2002; Wehby et al.). Because students with EBD tend to receive less academic instruction than their nondisabled peers do (Wehby, Symons, & Canale, 1998), they are particularly vulnerable to academic failure, which may further exacerbate their behavior problems. Documented outcomes include high grade retention and drop-out rates, high failure rates on courses and tests, and poor adjustment as adults (Blackorby & Wagner, 1996; Frank, Sitlington, & Carson, 1995). Actually, compared to all other students with and without disabilities, students with EBD are the least likely to be successful in school (Landrum, Tankersley, & Kauffman, 2003).

Even though it is well documented that students with EBD experience high rates of school failure (e.g., Landrum et al., 2003; Levy & Chard, 2001; Trout, Nordess, Pierce, & Ep-

stein, 2003), there has been minimal research on effective interventions for improving their academic performance (Lane et al., 2002; Wehby et al., 2003). In light of the evidence that behavioral disorders and academic achievement are reciprocally linked (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004; Trout et al.), researchers are beginning to direct more attention to addressing academic interventions for students with EBD (Lane et al.).

One academic skill that is especially important for school success is reading proficiency. Given that students with EBD seem particularly vulnerable to reading difficulties (Coleman & Vaughn, 2000; Vaughn et al., 2002), utilizing best practices for teaching reading is critical. One of the key components for attaining reading success, for both students with and without disabilities, is the ability to read fluently (National Reading Panel, 2000; Therrien, 2004). The National Reading Panel describes fluency as the ability to orally read quickly, accurately, and with proper expression. Disfluent readers struggle with word recognition, fail to comprehend various types of text, have little motivation to read, and spend less time reading (Chard, Vaughn, & Tyler, 2002; Mastropieri, Leinart, & Scruggs, 1999; Stanovich, 1986).

Fortunately, researchers have identified critical instructional variables for effectively increasing reading proficiency. Results from reading fluency studies indicate that students

should be provided with reading material on their instructional level (Gibb & Wilder, 2002; Scott & Shearer-Lingo, 2002); multiple opportunities for repeated practice (Chard et al., 2002; Coleman & Vaughn, 2000; Scott & Shearer-Lingo; Sutherland et al., 2003); corrective feedback (Chard et al.; National Reading Panel, 2000; Therrien, 2004); and a way to monitor progress (Gibb & Wilder; Scott & Shearer-Lingo). The most often-used intervention to improve reading fluency is repeated readings (Kuhn & Stahl, 2003; Therrien). Repeated readings require that the student orally read a passage several times during each session. For each successive reading, the student tries to increase the number of words read per min (Samuels, 1979). Repeated reading has been demonstrated to increase oral reading rate, accuracy, and comprehension for students with and without disabilities in elementary, middle, and high school (Mastropieri et al., 1999; Therrien).

Scott and Shearer-Lingo (2002) examined the effects of a repeated readings intervention, using the *Great Leaps* (Mercer & Campbell, 1998) program, on the reading rate and the on-task behavior of three seventh graders with EBD. The *Great Leaps* program consisted of 1-min daily timings of letter sounds, phrases, and brief stories. Each student was provided with individual instruction during 10-min sessions and repeatedly read the same lessons each day. After reaching a criterion reading rate, students moved on to the next lesson. Each new lesson began with a review of errors from the previous lesson. All three students showed distinct increasing trends in reading proficiency with at least moderate gains in reading rate. The greatest increase in mean reading rate was 21 words per minute (WPM) in baseline to 85 WPM at the end of the study. Additionally, all three students showed increases in on-task behavior during reading instruction. This study demonstrated a functional relationship of repeated readings on oral reading fluency, but reading comprehension was not examined.

In addition to reading rate, reading comprehension was examined in a later study with six middle school students diagnosed with EBD. Similar to Scott and Shearer-Lingo (2002), Strong, Wehby, Falk, and Lane (2004) used *Great Leaps* reading materials, but combined them with *Corrective Reading* (Engelmann, Hanner, & Johnson, 1999). *Corrective Reading* is a scripted direct instruction (DI) program comprised of word attack, group reading, and workbook exercises. During the repeated readings condition, pairs of students went to the library together with a research assistant. First they chorally read an unfamiliar passage twice from the *Great Leaps* series. Then each student read the passage individually while the other student followed along providing corrective feedback. After this repeated readings exercise, students were provided with a transfer passage (i.e., a new same-level reading passage) for the 1-min timed reading. The results demonstrated that students attained increases in oral reading fluency (with gains ranging from 12 to 36 WPM), and four of the six students answered more comprehension questions correctly. Strong et al. pointed out that, despite these improvements, the students'

oral reading rates were still inadequate compared to students without disabilities. They speculate that erratic attendance probably influenced student outcomes. The students were present for only 65% to 77% of the sessions.

The results of these two studies demonstrate that implementing repeated readings is a promising strategy for increasing reading fluency and comprehension for middle school students with EBD. The effects of repeated readings have also been examined on learners of English as a second language (Tam, Heward, & Heng, in press) and on students with learning disabilities (Chafouleas, Martens, Dobson, Weinstein, & Gardner, 2004; Nelson, Alber, & Gordy, 2004). Tam et al. combined vocabulary instruction and error correction with repeated readings and examined the effects on elementary students' reading rate and literal comprehension. Four of the five students made reading gains of 45% to 65% when presented with new passages. Additionally, all five students demonstrated notable increases in their reading comprehension performance.

Chafouleas et al. (2004) also used a repeated readings package, but combined repeated readings with performance feedback and contingent reward. Each of the three participants (elementary students with learning disabilities) increased their reading rate. Two of them met criteria for mastery—60 or more words read correctly per min with three or fewer errors. Results demonstrated that the highest performing readers made the most gains with repeated readings alone, and the lowest performing reader made the most gains with repeated readings combined with performance feedback.

Instead of performance feedback, Nelson et al. (2004) combined repeated readings with systematic error correction and examined the effects on reading rates of second graders with learning disabilities. A multiple-baseline across students design consisted of the following conditions: baseline, systematic error correction, and systematic error correction plus repeated readings. During systematic error correction, the student read a passage for 5 min and the following procedure was used for each miscue: The teacher provided the correct word, the student repeated the word, and the student reread the sentence. After the 5-min reading period, the teacher reviewed each miscued word and then timed the student for 1 min while he or she reread the passage. In the error correction plus repeated readings condition, the same procedure was used, with the addition of two 1-min timed readings. During baseline, mean correct words per min ranged from 36 to 56, and errors per min ranged from 4.25 to 9.00. During systematic error correction, errors decreased to mean rates of 1.64 to 3.38, but reading rates did not increase by much. Combining repeated readings with error correction resulted in substantially higher mean reading rates (66 to 77 WPM), whereas error rates remained low.

The above studies identified systematic error correction and performance feedback as effective components for increasing reading accuracy and fluency of elementary students who struggle with reading. Additionally, Scott and Shearer-Lingo (2002) and Strong et al. (2004) demonstrated that using

repeated readings can be an effective intervention for increasing the reading performance of middle school students with EBD. Our study examined the effects of repeated readings with systematic error correction and performance feedback on the reading fluency and comprehension of four middle school students with EBD. Similar to Strong et al., the repeated readings component was added to the students' regular reading instruction, the *Corrective Reading* program. We assessed literal and inferential comprehension, along with correct reading and error rates. Additionally, we added a brief prediction component to the last phase of the study: Before reading the selection, the student read the title and made a prediction of what the story might be about. Then the student read the first two sentences and revised his or her prediction. We incorporated this component to determine if activating students' prior knowledge would be an efficient way to boost their comprehension (e.g., Anderson & Pearson, 1984).

The purpose of our study was to extend previous reading fluency research to middle school students with behavior problems attending a day treatment program in Mississippi. This study was designed to answer the following research questions:

- What are the combined effects of systematic error correction, performance feedback, and repeated readings on the reading fluency and comprehension (literal and inferential) of students with EBD?
- What are the effects of this repeated readings package plus prediction on the reading fluency and comprehension of middle school students with EBD?
- What are the students' opinions of the repeated readings intervention?

Method

Participants and Setting

The participating students were three boys and one girl, ages 12 to 15, attending a self-contained day treatment classroom

located in a Mississippi public middle school. Theo and Brian were sixth graders with emotional and behavioral disorders, and Kelly and Andrew were seventh graders with learning disabilities. Regardless of their special education ruling, all students attending this program were receiving treatment for behavior problems that required their removal from regular classroom placements.

The special education teacher nominated these four students to participate because they demonstrated substantial deficiencies in reading performance. These deficiencies were confirmed by their reading scores on the *Mississippi Curriculum Test* (MCT; Mississippi Department of Education [MDE], 2001). The *Mississippi Curriculum Test* is a statewide curriculum-based assessment of reading, language arts, and mathematics administered to students in Grades 2 through 8. The reading section consists of multiple-choice items such as using context clues, recognizing word structure or patterns, identifying vocabulary words, and comprehending passages and stories. Results of the MCT indicated the following grade-level reading proficiency for each student: Theo, Level 2; Brian and Andrew, Level 4; and Kelly, Level 6. Table 1 shows demographic and reading assessment information for each student. Additionally, Table 2 provides a narrative description of each student's behavior and learning profile as documented by teacher and therapist reports.

The students participating in this study received academic instruction in a self-contained classroom for 3 hrs each morning and counseling services for 3 hrs each afternoon. Data were collected between 10:00 a.m. and 11:00 a.m. in the students' self-contained classroom 3 days each week (Tuesday–Thursday) over the course of 11 weeks. In addition to the one or two data collectors, the following individuals were present in the self-contained classroom during experimental sessions: nine students, one special education teacher, and two teaching assistants. Three data collectors (one university professor and two doctoral students) alternated working with each student. During 12 of the 31 data collection sessions, a second observer was present to assess either interobserver agreement (IOA) or treatment integrity.

During treatment sessions, the individual behavior management plan for each student was in effect. Individual plans

TABLE 1. Demographic and School-Related Data

Student	Gender	Age	Ethnicity	Grade	Disability	MCT reading level	Analytical reading inventory	
							Oral reading	Comprehension
Theo	M	12	African American	6	EBD	2	Level 1	Level 2
Kelly	F	15	Caucasian	7	LD	6	Level 4	Level 4
Brian	M	13	Caucasian	6	EBD	4	Level 4	Level 4
Andrew	M	13	African American	7	LD	4	Level 6	Level 6

Note. MCT = *Mississippi Curriculum Test* (Mississippi Department of Education, 2001); EBD = emotional and behavioral disorder; LD = learning disabilities.

TABLE 2. Narrative Description of Behavior Problems and Academic Performance for Each Student

Student	Behavior problems	Academic performance ^a
Theo	Theo was receiving special education services under the emotional/behavioral disorders category. Typical inappropriate behaviors included verbal abuse toward adults and peers, throwing objects, refusing to comply with directions, and refusing to complete class work.	Theo was a sixth grader who performed on a first-grade level in reading, written expression, math, science, and social studies.
Kelly	In addition to having a learning disability, Kelly had been diagnosed with attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder. She was overly demanding for attention, impatient, disrespectful toward authority figures, argumentative, and overly sensitive to remarks by peers and adults. When she became upset, she would tantrum (e.g., yell, curse, rip apart and/or throw objects, fall out of her seat onto the floor). She occasionally would walk out of the classroom in anger.	Kelly was a seventh grader who performed on a fifth- to sixth-grade level in all academic areas.
Brian	Brian had been diagnosed with bipolar disorder, conduct disorder, and ADHD. When upset, he frequently engaged in emotional outbursts. Common behaviors during outbursts included screaming, crying, cursing, throwing paper or pencils, ripping up assignments or pages of books, throwing chairs or books, and refusing to acknowledge authority. When confronted about his behavior, he lied, made up excuses, and/or denied the behavior altogether.	Brian was a sixth grader who performed on a third-grade level in math and language, a fifth-grade level in reading, and a fourth-grade level in science and social studies.
Andrew	Andrew became easily frustrated with academic work. Although he was capable of completing the work, he required 1:1 assistance to stay motivated and on task. Occasionally, if he had 1:1 assistance to get started and he was praised constantly, he would complete the task. If Andrew did not receive immediate attention, he would complain and whine (e.g., "This is too hard; I can't do this"). Then he would put his head on his desk and refuse to sit up or respond verbally in any way.	Andrew was a seventh grader and performed at the fifth-grade level in all academic areas.

^aAccording to Mississippi benchmarks.

were based on a daily point and weekly level system, which ultimately led to the student transitioning out of the day treatment setting and into a less restrictive environment (e.g., resource room, general education classroom). The daily point system was arranged so that the students would earn points for performing their individual target goals. Daily and weekly point percentages were determined and corresponded to the program's level system and transition criteria. Minor disruptions were handled with redirections. Usually, recurrent minor problem behaviors would result in the student not earning points during that period. Major disruptions would first be handled with redirections as a means of de-escalation. Depending on the student reaction, loss of points or even a discipline referral may follow. According to the special education teacher, the students were motivated to earn the points because they wanted to transition out of the day treatment setting back to regular classes with their friends.

During experimental sessions, each student was pulled from either a group activity or independent seatwork for 10 to 15 min. In each session, the students were allowed to choose whether they wanted to participate. Anecdotally, the students always preferred the individual attention provided by the data

collectors, so disruptions were rare and minor. For this reason, we did not formally assess disruptive or off-task behavior during data collection sessions.

Reading Materials and Pretesting

Analytical Reading Inventory. One week prior to the beginning of our study, the second author administered the *Analytical Reading Inventory* (ARI; Woods & Moe, 2003), an informal instrument that assesses reading level by examining oral reading and reading comprehension skills. Analytical reading inventories are used by reading professionals and classroom teachers to assess student reading skill, to match appropriate reading level materials, and to monitor student reading progress (Rasinski, 1999). The ARI used in our study was an informal reading assessment that measured word recognition and comprehension. Students orally read grade-level passages and answered a combination of eight literal and inferential questions while the assessor recorded errors and comprehension responses. The responses were analyzed and coded for word recognition as independent (99%–100% accuracy), instructional (91%–98% accuracy), or frustration (90%

or below) and reported as reading levels or grade levels. Comprehension scores were coded as independent (90%–100% accuracy), instructional (75%–89%), or frustration (74% or below) and reported in the same manner.

Scores were reported as levels, which are equivalent to grades. So a score of Level 1 in word recognition indicates that a student can recognize words at the first-grade level. Similarly, correct comprehension answers following the reading of a passage determined comprehension ability. So a student who answered 75%–89% of the comprehension questions correctly is likely able to comprehend material at that grade level. Because the ARI mirrors actual reading behaviors in a classroom setting, it is a valuable tool for teachers and reading professionals in assessing student decoding and comprehension ability. Table 1 shows ARI reading levels for each student.

Reading Passages. The reading passages used in this investigation were selected from the *Macmillan McGraw-Hill* basal reading series (Flood et al., 2003) and *A New Day* basal reading series (Pearson et al., 1991). Before beginning data collection, we selected a series of 35 reading passages at each student's independent reading level as indicated by their scores on the ARI. So, for each session, Theo was provided reading passages at the first-grade level. To facilitate the reading of continuous text and to eliminate picture clues, Theo was presented with stories that were retyped from the basal (double spaced, in 16-point font). Brian, Kelly, and Andrew were provided reading passages at the fourth-grade level (read directly from the book, not retyped). Initially, Andrew was provided sixth-grade-level reading materials to match his ARI oral reading score. However, the sixth-grade reading material appeared to be at Andrew's frustration level (less than 91% accuracy). So, we scaled back to fourth-grade reading materials to correspond with Andrew's grade-level score on the *Mississippi Curriculum Test* (MDE, 2001; see Table 1). Each student was provided with a new reading passage for each session.

Reading Comprehension Questions. For each of the 35 selected reading passages, the experimenters developed four literal and four inferential comprehension questions. After the questions were developed, they were examined by two special education teachers to determine that they were approximately equal in level of difficulty. Questions were revised if they were determined by either special education teacher to be either too difficult or too easy. Then the stories were randomly assigned to each condition of the experiment (baseline, repeated readings, and repeated readings with prediction). The reading level of all selected passages for each student remained the same throughout the duration of the study.

Intervention Description

The following sections describe each of the three experimental conditions implemented in this study: baseline, repeated

readings, and repeated readings plus prediction. Prior to and throughout the study, all students were provided with reading instruction using *Corrective Reading*, a direct instruction program for older students with reading deficits.

Baseline. One of the three data collectors presented a reading passage and prompted the student to read the passage orally (e.g., "I want to listen to you read this story, and then I want you to answer questions about it. Try to do your best."). As the student read, the data collector recorded each word as correct or as an error while timing the student for 1 min. The data collector marked the word the student reached at the end of 1 min and prompted the student to read the rest of the passage. The number of words read correctly and incorrectly was not recorded after the first min. When the student completed the reading passage, which took approximately 5 to 7 min, the data collector administered an eight-item oral comprehension test, recorded the student's answers, and recorded the number of literal and inferential comprehension questions answered correctly. After the student completed the comprehension test, the data collector provided him or her with immediate feedback on the accuracy of each response (providing praise for correct answers). After the student read the selection and answered the questions, the data collector provided praise (e.g., "Good work today").

Repeated Readings. The repeated readings condition included the systematic error correction procedure used by Nelson et al. (2004) and a performance feedback component similar to Chafouleas et al. (2004). The data collector presented the reading passage and prompted the student to read the story. While the student read, the data collector recorded each word as correct or incorrect. Each time the student produced a reading error, the following error correction procedure was used: The data collector read the word correctly, prompted the student to repeat the word, and provided praise if the student was correct. Upon completion of reading the passage (approximately 5–7 min), the data collector reviewed each reading error by pointing to the word and saying, "What's this word?" If the student responded correctly, the data collector delivered a praise statement. If the student responded incorrectly or did not know the word, the data collector stated the word, prompted the student to repeat it, and delivered a praise statement.

After this procedure, the student was told he or she would be timed to see how many words he could read in 1 min. Performance feedback was delivered using the following procedure: After the 1-min timed reading, the data collector counted the number of words read correctly and reported that number to the student. For the second timed reading, the data collector encouraged the student to try to beat his first WPM score. When the student exceeded the number of words read per min on the second timed reading (which was always the case), he or she received praise. The data collector would then point out the difference between the end reading rate of the current ses-

sion to the previous session. If the reading rate improved, praise was provided (e.g., “Your fastest reading yesterday was 89 words per min, but today you read 98! That’s 9 more words. Great job”). If the reading rate did not improve, the teacher encouraged the student to try to do better next time. Using the same procedures as in baseline, the comprehension check was administered immediately after the second timed reading.

Repeated Readings Plus Prediction. The data collector presented the reading passage and asked the student to read the title and to predict what the story would be about. Then the student was asked to read the first two sentences and to modify his or her prediction. After the second prediction, the student read through the whole passage. When the student finished reading, the data collector and student briefly discussed how closely the student’s predictions matched the events of the story. This discussion was followed by two 1-min timed readings and an eight-item comprehension test, as described in the previous repeated readings condition. The prediction component added about 1 min to the repeated readings procedure.

Data Collector Training. Before data collection, the observers were provided with a procedural checklist for each condition of the study: baseline, repeated readings, and repeated readings plus prediction. After the first author explained and modeled each step, the data collectors role-played the procedures and received feedback from the first author. The data collectors were able to role-play each sequence in each condition to 100% accuracy for three consecutive trials before data collection. During the week prior to data collection, IOA and procedural reliability were assessed during one practice session with each student. IOA for each student for correct and incorrect WPM and reading comprehension questions was over 98%, and procedural reliability was 100% for all four students. The data for the practice session was not included on the students’ graphs. The first day of data collection began the following week.

Dependent Variables

The dependent variables were as follows: number of words read correctly per min, number of errors per min, and number of literal and inferential comprehension questions answered correctly.

Correct Words per Minute. During each session across all three conditions, a data collector administered a 1-min timed reading to the student and recorded each word as either correct or incorrect. At the end of each timed reading, the data collector counted and recorded the total number of words read correctly. A word was counted as correct if the student independently pronounced it accurately within 3 s without prompting. If a student read a word incorrectly and self-

corrected without prompting within 3 s, the word was counted as correct.

Errors per Minute. At the end of each 1-min timed reading, the data collector also counted the number of reading errors. A word was counted as an error if it was stated incorrectly, omitted, miscued, or not stated within 3 s. If a student read a word incorrectly or hesitated for more than 3 s, the data collector orally provided the word to the student and the student continued reading.

Reading Comprehension. After the student read the passage, the data collector orally administered a comprehension test and recorded the student’s verbatim responses. The student was not prompted in any way to extend his or her answer. Each comprehension test consisted of eight open-ended questions (literal and inferential) about specific events in the story. The literal comprehension questions required students to recall explicitly stated details from the reading selection (e.g., “Where did Walter usually stop on his way home from school?” “Why were the fishermen celebrating?” “What did Amelia do every time her father took out the map?”), and the inferential questions required students to conclude information not explicitly stated in the story (e.g., “How did Walter’s dream change him?” “Why was the tree special to Amelia?” “Why did Justin feel guilty?”). A response was counted as correct if it matched one of the possible responses listed on the answer key developed prior to the beginning of the study. All other responses including unanswered or partially answered questions were scored as incorrect.

Interobserver Agreement and Treatment Integrity

Interobserver Agreement for Correct WPM and Errors WPM. Interobserver agreement (IOA) for correct and incorrect words per min was assessed during 7 (23%) of the 31 experimental sessions. A second observer referred to a copy of the student’s reading passage and independently marked each word the student read as correct or incorrect. The observer’s marked copies of the reading passage were compared to determine IOA. An agreement was counted if both observers scored a word the same, either correct or as an error. A disagreement was counted if the observers differed on their scoring of a word. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Mean IOA for each student on correct WPM and errors per min was as follows: Theo, 99%; Kelly, 100%; Brian, 100%; and Andrew, 98%.

Interobserver Agreement for Reading Comprehension. After the timed reading, the data collector administered an oral comprehension test. On 7 (23%) of 31 sessions, a second observer was present to independently and simultaneously

record each student response, compare student responses to an answer key, and mark each answer as correct or incorrect. An agreement was scored if both observers marked a response as correct or both marked a response as an error. A disagreement was scored if one observer marked an answer as correct and the other observer marked it as an error. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Mean IOA for each student on reading comprehension responses was as follows: Theo, 99%; Kelly, 100%; Brian, 99%; and Andrew, 97%.

Treatment Integrity. Treatment integrity was assessed during 5 (16%) of the 31 experimental sessions. On these sessions, the first author used a procedural checklist to assess the data collectors' adherence to the experimental procedures. During all sessions in which procedural reliability was assessed, each data collector followed the procedures in correct sequence to 100% accuracy.

Social Validity

One week after the end of data collection, a data collector interviewed the students to determine their opinions of the intervention procedures used in this study. They were asked the following questions: "How do you think this study affected your reading performance?" "What did you like about doing repeated readings and answering questions?" "What did you dislike about it?"

Experimental Design and Data Analysis

A multiple-baseline across students design (Cooper, Heron, & Heward, 1987) was used to examine the effects of repeated readings on the number of correct words per min, errors per min, and on the number of comprehension questions answered correctly. With this design, data analysis is accomplished through visual inspection in which performance during intervention is compared to baseline performance. In a multiple-baseline across students design, a functional relationship is demonstrated when baseline levels are stable and the behavior changes only when the independent variable is applied. Robust effects are demonstrated by clear differences in responding with minimal overlap of data paths across conditions. Experimental control is strengthened each time the effects are replicated for a different student.

In this study, we examined the number of correct words per min to determine when to begin the intervention for each student. We intervened with Theo first and Kelly second because of their low and stable baseline responding and absence of upward trends. Although Brian showed a continuing upward trend in baseline, we decided to intervene with him third because we were concerned about Andrew's high number of absences in baseline. An analysis of each student's performance follows.

Results

Correct Words per Minute

Figure 1 shows the number of correct words per min in each of the 31 sessions. The data paths show a similar pattern for three of the four students. Theo, Kelly, and Andrew showed a stable baseline responding with no trends. With the introduction of repeated readings, there was an immediate increase in reading rate with an ascending trend. When prediction was introduced, there was a slight increase in level and a continuing upward trend. Brian's data pattern, however, shows a consistent ascending trend beginning in baseline and continuing throughout the study. With the introduction of each new condition, there were no apparent changes in Brian's data path. Table 3 shows the mean number of correct words and errors per min for each student. Reading rates ranged from 38.8 to 91.6 in baseline, 95.6 to 133.7 in repeated readings, and 117 to 154 in repeated readings plus prediction.

Errors per Minute

Figure 2 shows the number of errors read per min in each session. All four students showed high variability in baseline, with mean error rates ranging from 2.8 to 3.7 across students. During repeated readings, Theo and Andrew showed an immediate decrease in error levels and more stable responding (mean errors, 1.3 to 2.2). Brian also showed an immediate decrease in errors compared to his last baseline session. However, prior to Session 16, Brian's error rate was very low (0–1 error per min) for five consecutive baseline sessions. Kelly showed an initial increase in errors and continued variability for the first five sessions followed by low and stable error rates (mean errors = 3.6). During prediction, errors remained low for all four students, with mean error rates ranging from 1.1 to 1.5.

Reading Comprehension

Figure 3 shows the number of literal and inferential questions answered correctly during each session. All four students had highly variable baseline responding followed by increasing stability when repeated readings was introduced. For Theo, there was an increase in mean level for both literal and inferential questions accompanied by increased stability, with no trend apparent. Introduction of prediction had little effect on the literal questions, but there was an increase in inferential questions accompanied by decreased variability.

For Kelly, Brian, and Andrew, there was an immediate increase in literal comprehension accompanied by increased stability after highly variable responding in baseline. For inferential comprehension, there was no immediate change in level during the first intervention, but an increasing trend was apparent after the first few sessions. When prediction was in-

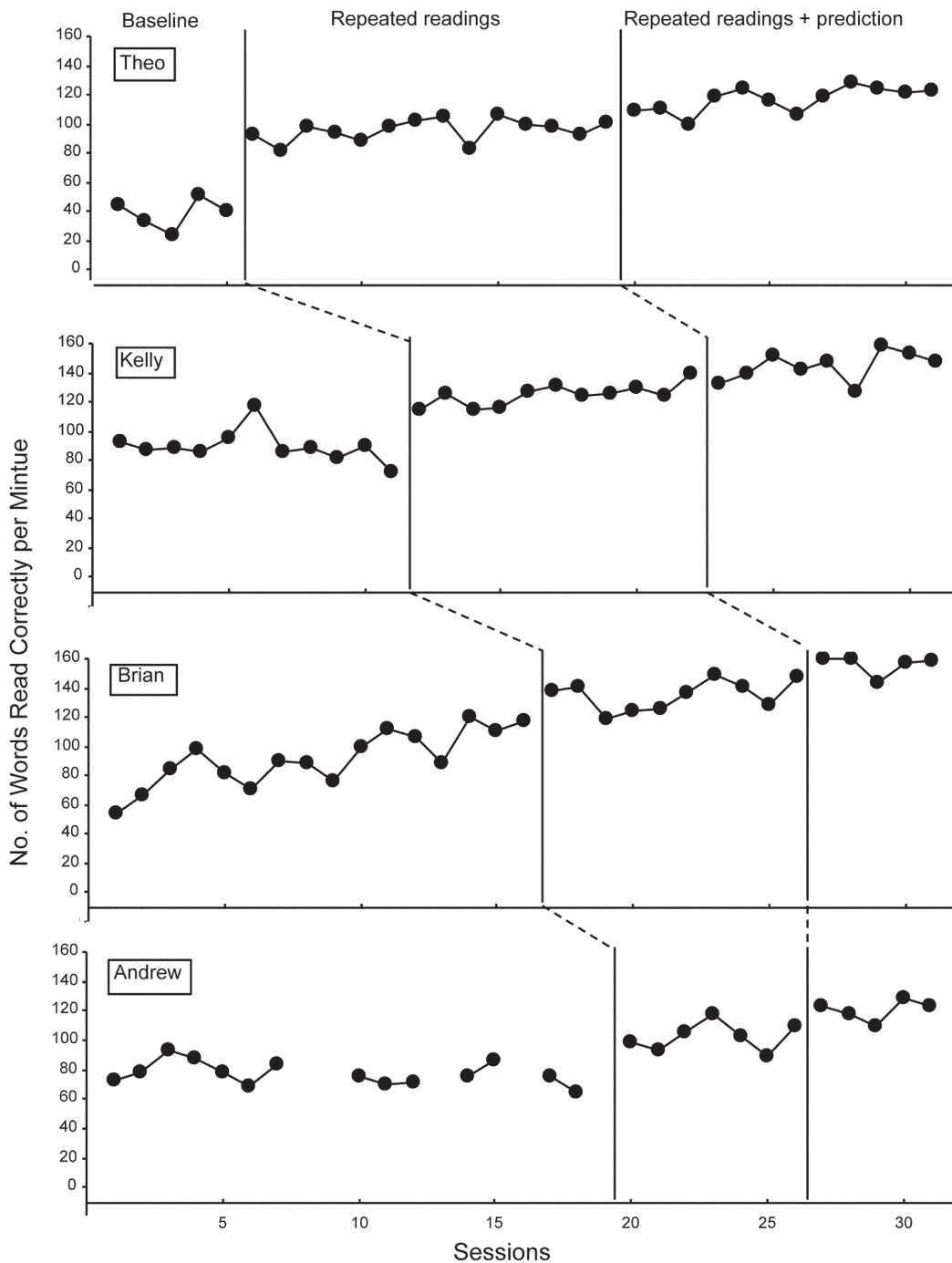


FIGURE 1. Number of words read correctly per minute by each student in each condition.

roduced, the number of literal and inferential comprehension questions answered correctly remained consistently high.

Table 4 shows the mean number of literal and inferential comprehension questions answered correctly in each condition. During baseline, literal comprehension questions answered correctly ranged from 1.8 (Theo) to 3.2 (Andrew), and inferential questions ranged from 1.2 (Theo) to 2.5 (Kelly). During the second phase, the mean number of correct responses

ranged from 3.2 (Theo) to 3.8 (Kelly and Andrew) for literal comprehension and 2.8 (Theo) to 3.2 (Andrew) for inferential comprehension. In the repeated readings plus prediction condition, students scored consistently higher on the literal comprehension questions. Kelly, Brian, and Andrew each answered 4 out of 4 literal comprehension questions correctly on every session of the last phase, and the mean number of inferential comprehension questions ranged from 3.4 to 3.5.

TABLE 3. Mean Number of Correct Words per Minute and Errors per Minute in Each Condition

Student	Baseline		Repeated readings		Repeated reading + prediction	
	Correct	Errors	Correct	Errors	Correct	Errors
Theo	38.8	2.8	95.6	1.4	117.0	1.1
Kelly	89.4	2.5	124.6	3.6	144.4	1.1
Brian	91.6	3.7	133.7	2.0	154.5	1.5
Andrew	77.1	3.1	101.2	2.2	118.7	1.2

Student Opinions

One week after the last day of data collection, a data collector interviewed the students individually to assess their opinions of the intervention. All four students indicated they knew their reading improved (e.g., “It’s pretty cool because I’m reading a lot better.” “I can read faster now and I’m finishing more of my work”). Additionally, they all suggested they liked receiving individual assistance and attention (e.g., “I like getting help with words I don’t know.” “I liked reading to you and answering the questions”). Three of the four students said they liked being timed, but Brian said he did not “because it made me rush and mess up words I already know.” Andrew and Brian also indicated that they liked the stories (“The stories were good.” “I liked the story about the boy that dreamed”).

Discussion

This study examined the effectiveness of repeated readings with systematic error correction and performance feedback on the reading fluency and comprehension of middle school students with severe behavior problems. A functional relationship was demonstrated for repeated readings on correct words and errors per min for three of the four students. For literal and inferential comprehension, all four students showed increased stability of responding after baseline.

Reading Fluency

The data patterns for three of the four students indicate that repeated readings had a significant effect on increased reading fluency. However, beyond the continuing upward trend of data (see Figure 1), there does not appear to be any change when prediction was introduced. The prediction component was added to influence reading comprehension, so no change in fluency was anticipated for this variable. For Brian, it is difficult to determine the extent to which the intervention influenced his reading fluency. His data show a change in level with the introduction of repeated readings, but the upward

trend during baseline and Brian’s overall data pattern indicate a possible therapeutic trend. The functional relationship demonstrated for three of the students supports previous research that repeated readings is an effective intervention for students with severe behavior problems (Scott & Shearer-Lingo, 2002; Strong et al., 2004).

Reading Errors

All four students showed decreases in their overall mean error rates in each subsequent phase of this study (see Table 3 and Figure 2). Immediate decreases in errors were evident for Theo and Andrew. Brian also showed an immediate decrease in errors. However, prior to Brian’s final baseline session, his error rates were very low (0–1 error per min) for five consecutive sessions. If Brian had not made five errors on the session before repeated readings was implemented, no intervention effect would be apparent. Kelly was the only participant who showed an initial increase in error rate followed by a stable decreased error rate level.

Reading errors were consistently low for all students during the prediction phase, with a slight change in level for Theo and Kelly. Even though the number of words read per min increased substantially after baseline, error rates remained low. This result can most likely be attributed to the systematic error correction component in place after baseline. The functional relationship of this package on reduced error rates supports the findings of Tam et al. (in press) and Nelson et al. (2004).

Reading Comprehension

Over time, all four students showed more consistent responding to literal and inferential comprehension questions (see Figure 3). But given the patterns and trends in the data, it is difficult to determine if the changes were a result of the intervention for Kelly, Brian, and Andrew. Specifically, repeated readings had an immediate effect on literal comprehension, but a delayed effect on inferential comprehension. This latency could indicate that improvement for these three students was due to practice. When prediction was added,

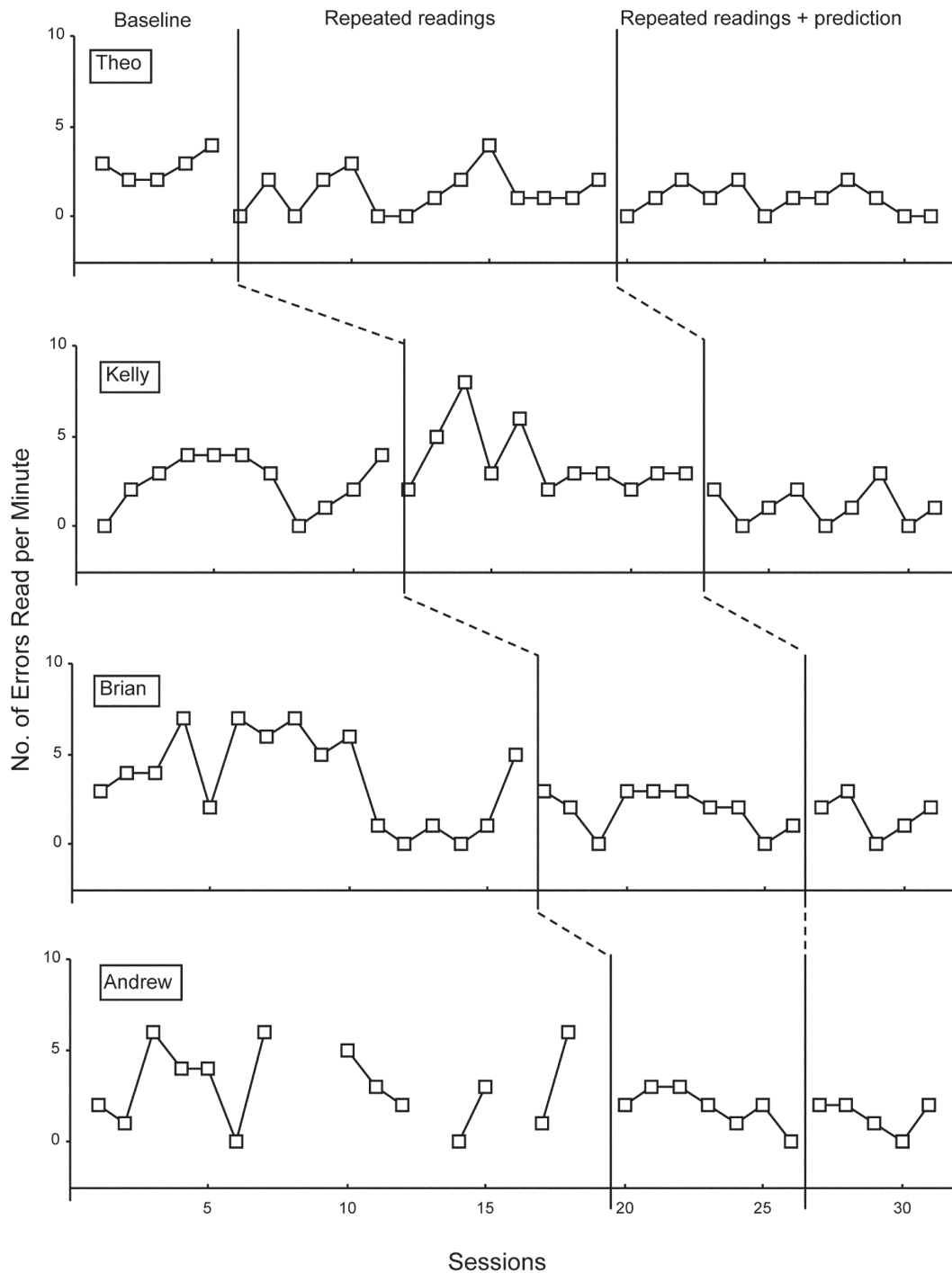


FIGURE 2. Number of errors per minute by each student in each condition.

Theo’s literal and inferential comprehension showed a change in level and increased stability. For the other three students, both literal and inferential comprehension levels were consistent with the end of the previous phase. It is likely that the prediction component positively influenced reading comprehension, but possible ceiling effects preclude us from drawing this conclusion for Kelly, Brian, and Andrew.

Student Opinions

Student opinions provide some evidence of social validity for the repeated readings procedures used in this study. Two of the students said they liked the stories, three said they liked being timed, and all four indicated they enjoyed receiving one-to-one attention and assistance. It is possible that the pos-

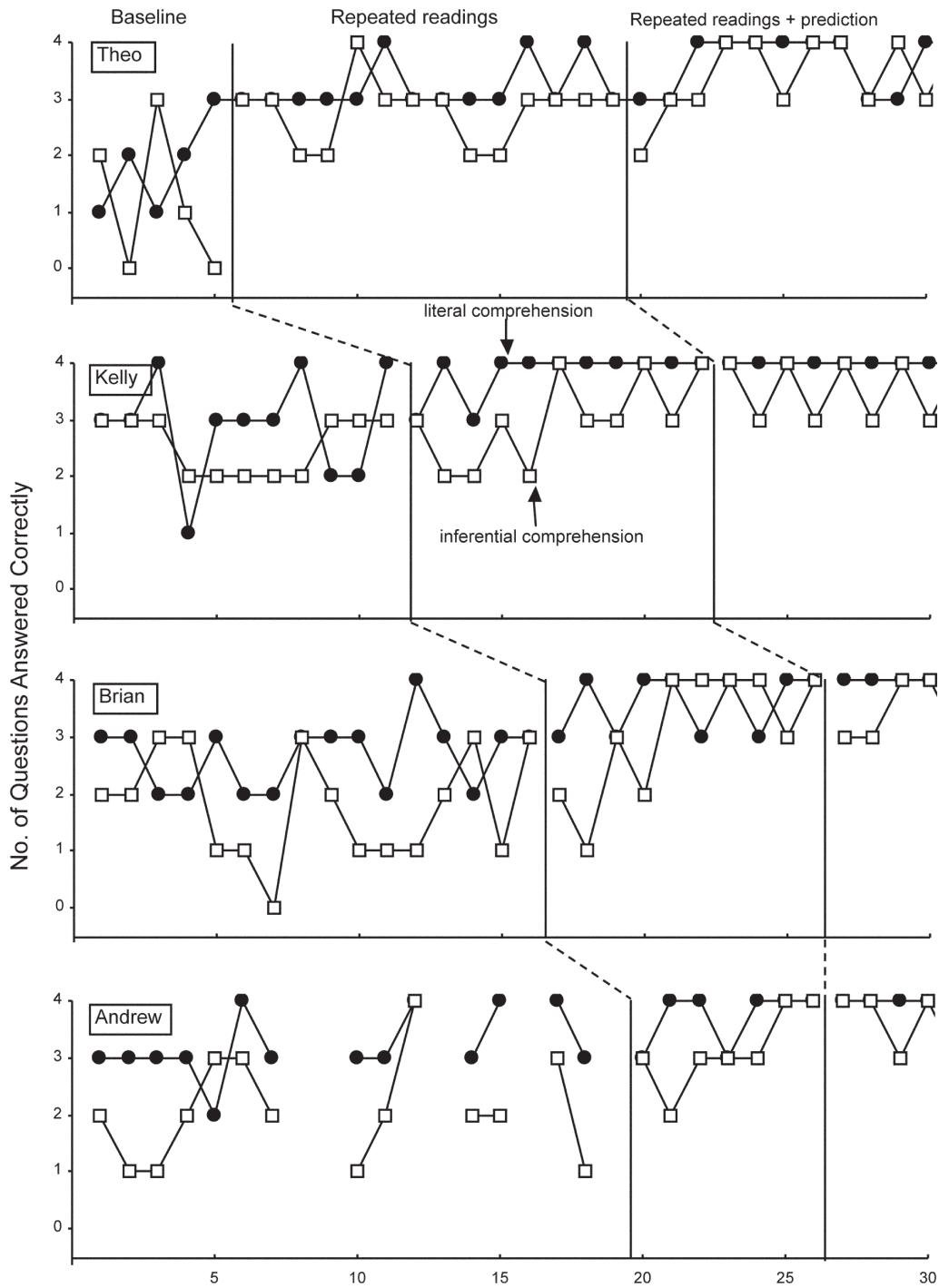


FIGURE 3. Number of literal comprehension questions (data points) and inferential comprehension questions (open squares) answered correctly by each student in each condition.

itive remarks reflected an intention to please the interviewing researcher. Anecdotally, however, the students were typically compliant during data collection sessions and rarely exhibited disruptive behaviors. This may be an indication that the students truly enjoyed the instructional procedures used in this study.

Connections to Previous Research

Results of the present study support the findings of previous research demonstrating the positive effects of repeated readings on fluency and comprehension (e.g., Chard et al., 2002; Kuhn & Stahl, 2003; National Reading Panel, 2000). Ther-

TABLE 4. Mean Number of Literal and Inferential Comprehension Questions Answered Correctly in Each Condition

Student	Baseline		Repeated readings		Repeated readings + prediction	
	Literal	Inferential	Literal	Inferential	Literal	Inferential
Theo	1.8	1.2	3.2	2.8	3.7	3.4
Kelly	2.9	2.5	3.8	3.1	4.0	3.5
Brian	2.7	1.8	3.6	3.1	4.0	3.4
Andrew	3.2	2.1	3.8	3.2	4.0	3.4

rien's meta-analysis (2004) noted large effect sizes for fluency ($ES = .83$, $SE = .066$) and moderate effect sizes for comprehension ($ES = .67$, $SE = .080$) when students were assessed on nontransfer reading passages (i.e., the passages they had been repeatedly reading). Consistent with Therrien's findings, the participants in this study made large gains in reading fluency and moderate gains in comprehension over the course of 11 weeks. Gains in mean reading rates ranged from 41.6 (Andrew) to 78.2 (Theo) words per min, and mean comprehension improved by at least two correct responses for each student. By the end of the study, all four students were reading above 100 WPM with comprehension above 85%.

Similar to Scott and Shearer-Lingo (2002) and Strong et al. (2004), this study targeted middle school students with behavior problems and used a multiple baseline research design. Largely due to sporadic attendance, the participants in these previous studies showed only moderate improvements in reading fluency. The students in the Scott and Shearer-Lingo study showed mean gains of 11 to 64 correct WPM, and the students in the Strong et al. study showed mean gains of 12 to 36 WPM. The Scott and Shearer-Lingo study lasted approximately 10 weeks, but the students were present for only 12 to 24 sessions. Similarly, the students were present during only 65% to 77% of the sessions in the Strong et al. study. Had attendance been more frequent, the results of these two studies may have been more comparable to our results. Clearly, increased attendance and more practice opportunities are key components to the effectiveness of an intervention.

Another consideration when comparing the results is the use of transfer passages to measure reading rate and comprehension. The participants in the Strong et al. (2004) study practiced reading a passage four times and then were assessed with a new same-level passage. Consistent with the findings of Therrien (2004) on transfer passages, students in our study showed moderate gains in reading fluency with smaller gains in reading comprehension. In this study, we assessed using only nontransfer passages. If we had used transfer passages, we would be able to better compare our results with Strong et al.

Visual inspection of the data in the repeated readings studies for students with EBD reveals upward trends in cor-

rect WPM following the initiation of repeated readings interventions. Also noted, and consistent with the literature (Kuhn & Stahl, 2003), students who begin reading at higher levels in word recognition and comprehension make less dramatic progress than students at lower levels do. They are also susceptible to ceiling effects, as evidenced in our study on comprehension measures in particular, and in the Strong et al. (2004) study in terms of correct WPM. The results of this study, in support of previous research, indicate that a relatively simple, time-efficient repeated readings strategy shows potential for improving reading fluency and comprehension for students with severe behavior problems.

Limitations and Future Research

Some of the limitations of this study were related to the students, setting, materials, and instructional arrangement. Although all four students were being treated for behavior problems, only two students were diagnosed with EBD. The other two students were diagnosed with learning disabilities. Because the population varied with regard to their disability categories, this limits the extent to which findings can be generalized to one specific disability category.

With regard to setting, data were collected over 11 weeks in one self-contained day treatment classroom, in which individual reading instruction was provided by university researchers using controlled vocabulary fiction passages. Because the students did not move to other classrooms like typical middle school students do, we were unable to assess generalization of reading proficiency to other classrooms. Also, we did not examine fluency and comprehension with other types of reading materials (e.g., content area, nonfiction). Repeated readings research would be strengthened by attempts to assess generalization to different settings (in and out of school), with a variety of reading materials, and over extended periods of time.

Concerning the instructional arrangement used in this study, the students benefited from and enjoyed receiving individual instruction. However, this one-to-one teaching arrangement may not always be possible in EBD classrooms. Additionally, since instruction was delivered by researchers,

questions arise as to whether teachers and paraprofessionals would be willing and able to implement the procedures. Because the teaching procedures are effective, brief, and relatively easy to implement, we speculate that teachers would be able to work this approach into their reading instruction. Future research would benefit from an examination of different instructional arrangements most effective and practical for classroom teachers and paraprofessionals delivering reading fluency interventions.

Similar to Strong et al. (2004), the repeated readings intervention was a supplement to *Corrective Reading*, a direct instruction program that was already in place during the first half of the school year. Informal classroom observations during the weeks prior to data collection verified the use of the *Corrective Reading* program in this study. However, fidelity data were not collected for the implementation of this reading program. This limits the extent to which we can draw conclusions about the additive effects of repeated readings to this particular program. Because repeated reading is best used as a supplement to effective instruction, future research would be enhanced by examining the effects of repeated readings when used in combination with various reading programs or methods.

Another limitation of this study was the way reading comprehension was assessed. Students answered open-ended literal and inferential comprehension questions. The reading passages were brief, so it was difficult to generate more than eight questions. This may have contributed to a ceiling effect that limits any conclusions drawn about the use of the prediction strategy. Future research may be enhanced by examining other ways to assess reading comprehension, such as using a cloze procedure, retelling, paraphrasing, or writing. Additionally, future research should attempt to examine the effects of other brief reading comprehension strategies such as self-questioning, story mapping, KWL (what I know, what I want to know, what I learned) charts, or graphic organizers.

Implications for Practice

For a variety of reasons, time devoted to academic instruction has been minimal for students with EBD (Vaughn et al., 2002; Wehby et al., 2003). The students in our study received academic instruction for only half of the school day. Because students with EBD may not be receiving their fair share of instructional time, teachers must be particularly efficient when delivering instruction. Implementing repeated readings is an efficient way to produce substantial gains in reading performance over a short period of time. In this study, students were provided with fluency instruction for 10 to 15 min per day on 3 days each week and showed dramatic increases after only 11 weeks.

We make the following recommendations for practitioners based on the results of this study and of other repeated readings research: Use repeated readings as a supplement to an evidence-based reading program, accompany repeated readings with systematic error correction and performance

feedback, and consider using a brief comprehension strategy with repeated readings. To accommodate the need for one-to-one instruction, teachers should consider involving parents, paraprofessionals, volunteers, or peer tutors to help implement the intervention. The current study demonstrates that, under appropriate instructional conditions, students with behavior problems can demonstrate significant improvement in academic performance. Strategies that consider the reciprocal nature of academic and behavioral interventions for EBD students show promise for success.

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